# 1940

May we wish our
many railroad friends
happiness and prosperity
during the New Year.

THE P. & M. CO.

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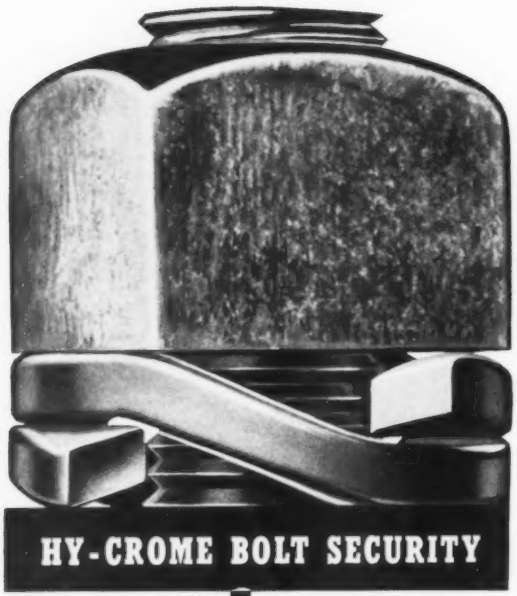
# Reliance HY-CROME Spring Washers




## Maintain a bolt Tension

### PREVENT LOOSENESS

- **BOLT TENSION** resulting from the reactive pressure of a spring washer is efficient only as long as it can be maintained, therefore, the spring washer must have adequate reactive range.
- **BOLT LOOSENESS** developed from frictional wear of nut faces — breakdown of scale — paint — and high surface points — thread fatigue or torsional stress in assembly will reduce this tension.
- **HY-CROME SPRING WASHERS** efficiently compensate for looseness or wear because they possess sufficient reactive pressure over an adequate reactive range. An inferior spring washer will aggravate or accelerate wear.
- **LIFE OF ASSEMBLIES** can be prolonged and wear retarded if scientifically developed Hy-Crome Spring Washers are used. Our Sales Engineers will gladly call and explain our Hy-Crome line without obligation.

EATON MANUFACTURING COMPANY

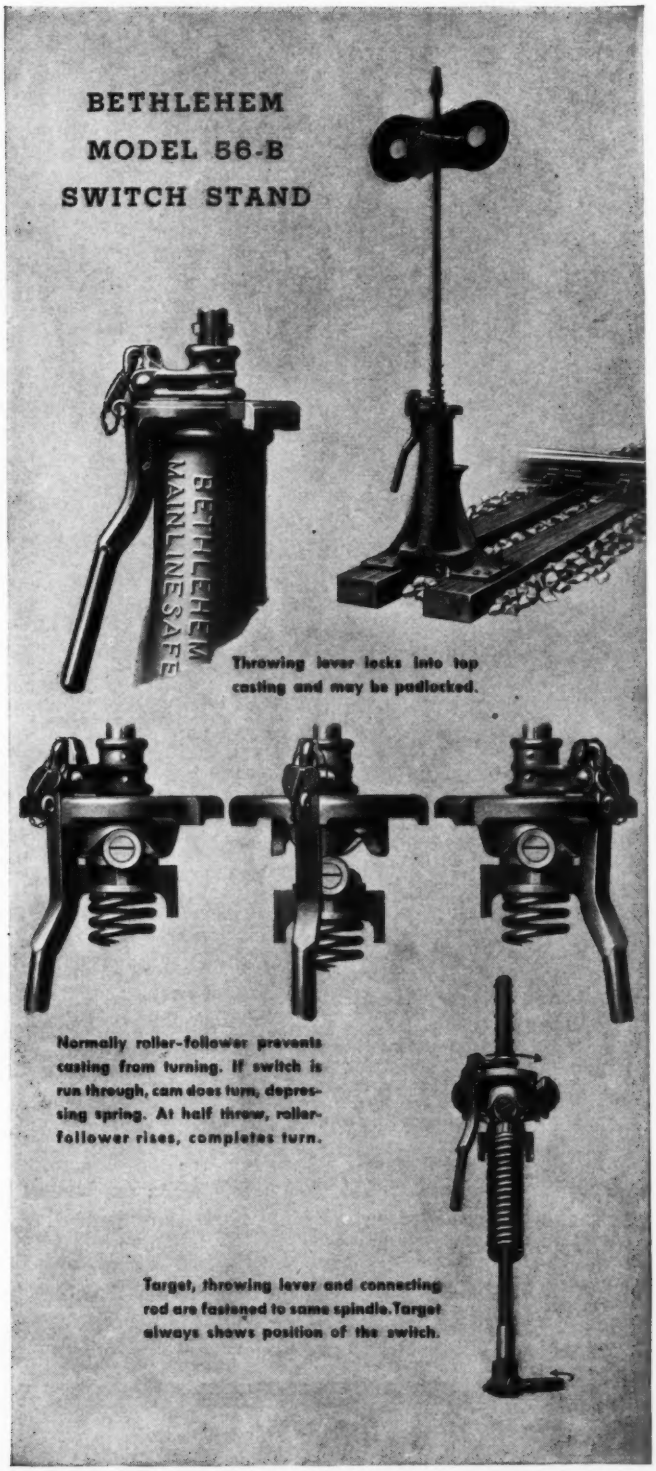
**RELIANCE SPRING WASHER DIVISION**

MASSILLON, OHIO

*Sales Offices:* New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Montreal


Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago, Illinois. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 25 cents. Entered as second-class matter January 29, 1933, at the postoffice at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago, Ill.

# An automatic switch stand


BETHLEHEM
MODEL 56-B
SWITCH STAND
BETHLEHEM MAINLINE SAFE
Throwing lever locks into top casting and may be padlocked.
Normally roller-follower prevents casting from turning. If switch is run through, cam does turn, depressing spring. At half throw, roller-follower rises, completes turn.
Target, throwing lever and connecting rod are fastened to same spindle. Target always shows position of the switch.

## . . . for main-line service

Bethlehem Model 56-B switch stand is a compact, rugged, automatic stand. It is used on mainlines where it is desirable to have switches "throw over" when run through.

The rotary-throw stand operates on the cam-and-spring principle: the throwing lever is bolted and keyed to a vertical spindle or shaft. This spindle moves the connecting rod through a screw-eye crank. The automatic feature results from the method of locking the throwing lever.

The top casting, into which the lever locks, has a 4-lobe cam on its under side. Normally a roller follower, held against the lobes, prevents the top casting from turning. When the switch is run through, however, the thrust against the points forces the casting to turn, depressing the follower against a powerful spring. As soon as the points are more than half way over, the follower completes the throw, snapping the cam, lever, and target into the new position.

Model 56-B switch stand is built to take years of severe service without appreciable wear. It can be locked without hindering its automatic throw-over action. A modification of the same stand, but with a different top casting, will serve as an automatic-return switch stand. In this case, the roller follower returns the points, throwing lever, and target to the initial position.

BETHLEHEM STEEL

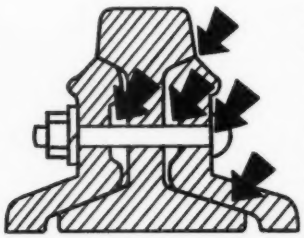
**BETHLEHEM STEEL COMPANY**

# HOW TO PREVENT CORROSION AT RAIL JOINTS

*Coating angle bars, track bolts, and bond wires with NO-OX-ID to prevent corrosion caused by brine and other corrosion accelerators.*

## An Easy Way to cut maintenance caused by corrosion

You can prevent corrosion of angle bars, track bolts, rails, and bond wires by brushing on a coating of NO-OX-ID at the time the new rail is being laid. Joints so protected are not affected by brine drip and other corrosion accelerators. They show a much longer service life and are easily maintained and kept tight. The NO-OX-ID protected rail joint not only does not rust, but it is lubricated by the petroleum vehicle used in the coat. The cost of protection by NO-OX-ID is small compared with the savings made in maintenance and replacement costs.

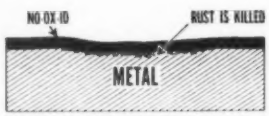


**NO-OX-ID reduces rail joint maintenance by preventing corrosion at the concealed and inaccessible surfaces of angle bars and track bolts, at the points indicated by arrows**

For full protection, NO-OX-ID "A Special" should be brushed on the portion of the rail behind the angle bar. The entire angle bar and track bolts should also be coated. NO-OX-ID can be applied cold.

Many railroads have also reduced maintenance expense by using NO-OX-ID on bridges, turntables, track scales, tanks, and pipe lines. Write for booklet showing consistencies of NO-OX-ID and method of application.

**NO-OX-ID GIVES DOUBLE PROTECTION**




NO-OX-ID maintains a plastic, bonded coating that will not crack and admit moisture and air. It also contains chemical inhibitors that prevent underfilm corrosion. In addition, the vehicle is a petroleum product that provides lubrication for rail joints.

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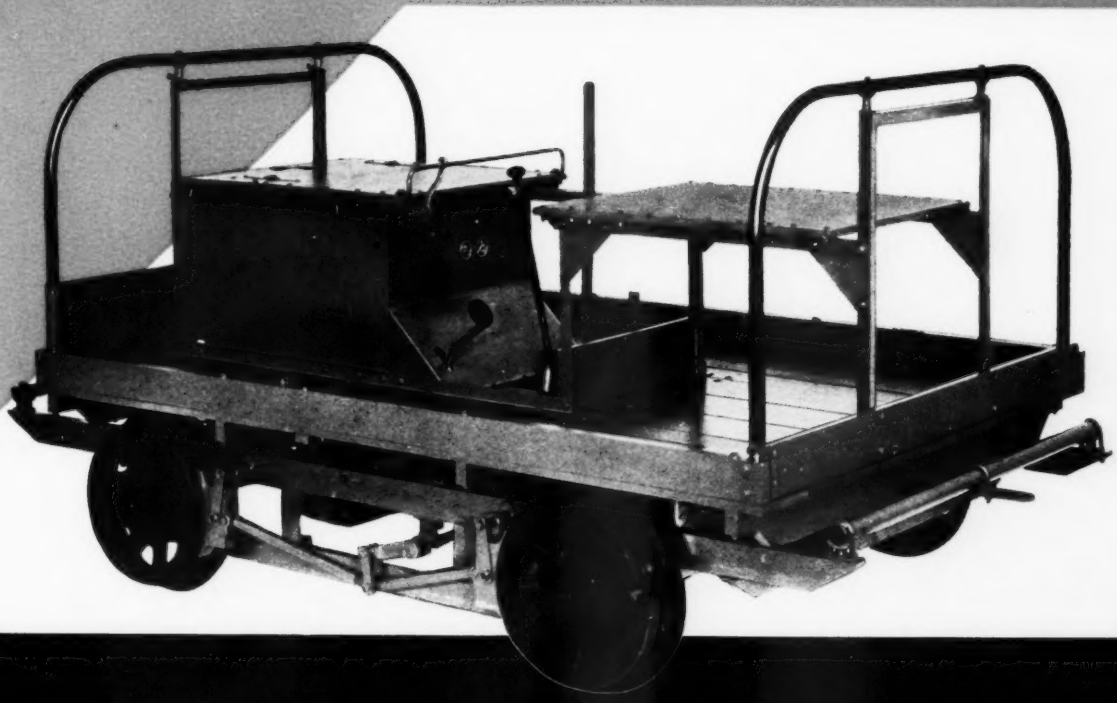
- STRUCTURAL STEEL FRAME
- 4 SPEEDS *REVERSE*
- TOWS 260 MEN AND TOOLS



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When it comes to pulling capacity, users will tell you "the Fairmont A5 Series C Car will outperform anything short of a locomotive." Its four cylinder 36 H. P. Waukesha engine generates an abundance of smooth power at a substantial fuel saving. The ruggedly built transmission with four speeds forward and reverse handle this power quietly and with maximum efficiency, providing extremely high drawbar pull at each of the four speeds. On level track the A5 Series C can pull 13 trailers loaded with 260 men at 30 miles per hour. The time saving economy is only one of many advantages typical of Fairmont design, with structural steel chassis, removable body, demountable wheels, and ready accessibility of major parts keeps maintenance cost at the minimum. Described in Bulletin 385A which will be gladly sent upon request.
Fairmont Railway Motors, Inc., Fairmont, Minnesota.

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*More Than Half are Fairmonts*

*Performance* ON THE JOB COUNTS

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**NOTICE**

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# TIMKEN

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CANTON, OHIO

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THIS ADVERTISEMENT APPEARS IN THE SATURDAY EVENING POST FOR DECEMBER 30

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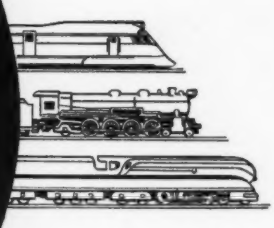

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Welcomed by economy-wise railroad maintenance superintendents everywhere as the ideal solution to true permanence in tie and timber installation, Giant Grip Dowels and Double Grip Spikes are making possible the saving of thousands of dollars in future maintenance costs.

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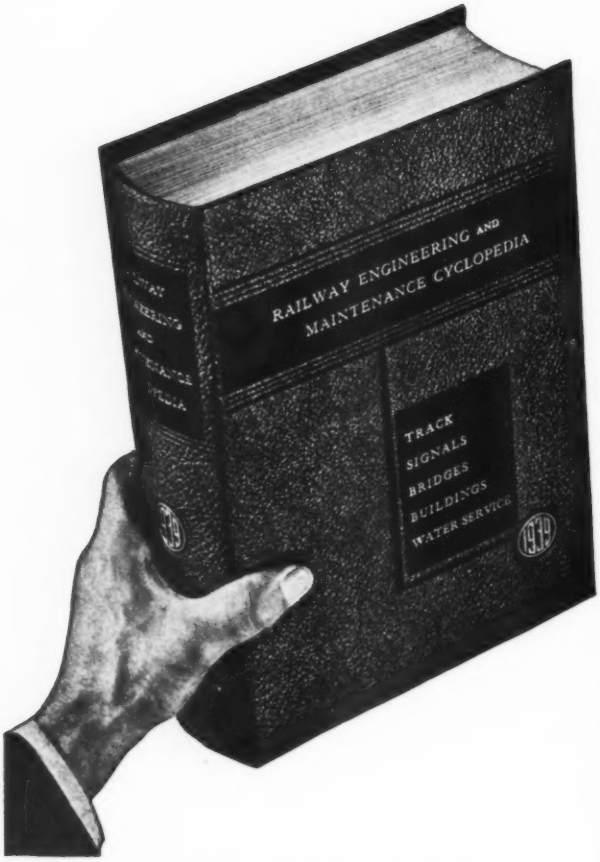


1,000 pages, 2,500 illustrations, 9 x 12 inches, maroon Fabrikoid, $5.00

The new Fourth Edition contains the only up-to-date compilation of coordinated engineering knowledge on track, bridge, building, water service and signaling equipment. In this big volume are described all of the new materials, appliances and work equipment now in actual service on American railroads. Improved methods resulting from the use of this new equipment are described with the aid of photographs, line drawings, graphs and charts.

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No. 133 of a series


# Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.


**Subject:** A Directory of Live Manufacturers

January 1, 1940

Dear Reader:

As I begin the twelfth year of this series of monthly chats with you and look back over the 29 years during which I have been associated with you as the editor of Railway Engineering and Maintenance and its predecessor publication, I am impressed with the many changes that have taken place in that time. Especially thought-provoking to me are the changes that have occurred among the manufacturers who make the materials and the equipment that you use. Not a few of the companies that were active in 1911 are still in the field; yet others have disappeared and an even larger number of new companies have come into the field.

As I look back over these changes, the question arises as to why so many of these companies failed to survive. Have they disappeared because of the inferiority of their product? In some cases, yes, but not generally, for, by and large, railway materials and equipment have been well built. Have they fallen by the wayside because of the development of newer and better materials? This has been true in a number of instances, although in at least an equal number of instances companies have re-designed or improved their products to incorporate developments in materials or to meet the changing needs of their customers. Or have they been forced out of the picture by the more aggressive salesmanship of newer and younger companies? In other words, has their failure been one of management rather than of materials?

As I look back over those companies whose names were familiar a generation ago, but are all but forgotten today, I cannot help but conclude that in many cases the difficulty lies here. In other words, the large majority of the companies that have disappeared from the railway supply field have done so because of failure to meet changing conditions of railway operation and, even more largely, changing conditions in selling practices.

And nowhere have these selling practices changed more widely than with respect to advertising. A generation ago selling was largely a matter of personal relationships, frequently with the president of the railway. Today it is with the user and his number has multiplied greatly as it has become the more general practice to de-centralize responsibility and encourage the local men to develop methods and materials to meet their own problems. Furthermore, the day is one of rapid change, with one development following closely on the heels of another, necessitating constant education of potential users. A survey of the practices of successful companies shows that these companies are using advertising more and more as an essential element in their sales procedure to supplement the work of alert, aggressive staffs and to keep their products before railway men between the calls of these salesmen. Conversely, one of the first evidences of the decline of other companies has been the discontinuance of advertising.

Has it ever occurred to you that as Railway Engineering and Maintenance comes to you from month to month it not only brings you the newer developments in maintenance practices and materials in editorial and advertising pages alike, but that it also presents a directory of those manufacturers who are most alert in perfecting their products to meet your current needs and then in adopting modern methods of salesmanship—in keeping with the up-to-the-minute nature of the products themselves?

Yours sincerely,

Elmer T. Howson

ETH:EW

Editor


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TO BE RECLAIMED HERE
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## ...DO IT THIS SURE, ECONOMICAL AIRCO WAY

Now that the working season is over, you will be shopping and reconditioning work equipment for Spring use. A sure, quick, inexpensive way to be prepared is to fully utilize the Airco Oxyacetylene Processes.

The ballast moles pictured here, in for repair, are typical of the equipment repair problems profitably solved by the application of oxyacetylene welding and hard facing. Worn parts will be built up, then hard-faced for longer service . . . broken parts will be welded — at a fraction of the cost and time which replacement would require. When reconditioned, the moles will be as serviceable as new.

The savings made possible with time-proved Airco methods and equipment are important. Airco customers reduce their maintenance costs through the use of Airco 99.5% pure oxygen, acetylene, apparatus, and the practical advice of the members of our Applied Engineering Department. Write any Airco District Office for full details.

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Inspections show that the bottom of *any* drainage structure is the part that gets the wear. This is why ARMCO engineers developed the balanced design of ARMCO Paved Invert Pipe. A smooth, thick bituminous pavement protects where the wear comes and makes the bottom endure as well as the top. This way your culverts last longer, cost less per year of service, and you get full value out of the investment.

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# Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

JANUARY, 1940

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# DIFFICULT SPIKE PULLING MADE EASY

These two illustrations show how easy it is for the Nordberg Mechanical Spike Puller to remove spikes on bridges and at switches where it is difficult to work with hand tools. It is fast too, averaging 10 to 15 spikes per man per minute.

Pulling spikes by hand on open track under most favorable conditions is slow and expensive as compared with a Nordberg Spike Puller. When difficult spike pulling is encountered on bridges and trestles, or at switches and guard rails, this machine shows up to even greater advantage. It will get spikes that claw bars can not reach. Rail laying is not slowed down at every bridge or switch due to the difficulty of pulling hard-to-reach spikes. For greater speed and lower rail laying costs, pull the spikes with Nordberg Spike Pullers. They make difficult spike pulling jobs look easy.

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Spike Puller
Track Wrench
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**NORDBERG MFG. CO.** MILWAUKEE WISCONSIN

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Railway Engineering and Maintenance

# 1939

## A Year on the Upgrade

COMPARED with the depths to which they descended in 1938, the year 1939 was a big year for the railways in both earnings and accomplishments, although, in spite of an increase in their earnings, it cannot be said that it was a prosperous year for them. However, the year as a whole was on the upgrade, and this trend, with only slight modifications, is carrying over into the new year. As a result of these improved conditions, both construction and maintenance of way and structures programs showed increased activity during 1939, demonstrating again both the needs in these fields and the fact that, assured a volume of business which will offer a reasonably safe margin of net earnings, the railways will spend increasing sums for improvements and for the maintenance of their fixed properties.

For the year as a whole, freight traffic increased nearly 15 per cent over 1938, the increase being so sharp and unprecedented from August to October that some observers doubted the ability of the railways to meet the demand. Carloadings, which began their upward trend in November, 1938, continued above the 1938 level with virtually no interruption throughout the year 1939. For the year as a whole, loadings showed an increase of approximately 3,631,000 cars, or 11.9 per cent, the peak loading occurring during the week of October 21, with a total of 861,198 cars. This peak, which was 18.6 per cent higher than the peak of 726,142 cars attained in 1938, was higher also than the peak of 1936 and 1937.

### Looking Back Over the Year

Looking back over the year, the operations of the railways may be summarized in the following:

Revenue freight ton-miles were 14.6 per cent larger than in 1938; they exceeded those of any year from 1931 to 1935, inclusive, but fell short of the totals of 1936 and 1937 by 2 per cent and 7.8 per cent, respectively.

Revenue passenger miles exceeded the total for 1938 by 5.9 per cent; they were greater than in any year from 1931 to 1936, inclusive, but fell below the total for 1937 by 7.1 per cent.

Operating revenues increased 12.5 per cent over 1938, while operating costs (including expenses, taxes and operating rentals) increased 7.1 per cent.

Net railway operating income amounted to approximately $590,000,000 in 1939, an increase of 58.2 per cent over 1938, but was about the same as in 1937 and more than 11 per cent under that earned in 1936. This was a rate of return on property investment of 2.26 per cent, which compares with 1.43 per cent in 1938.

Railway tax accruals totaled $365,000,000, or approximately a million dollars a day in 1939, compared with $340,780,000 in the previous year, an increase of 7.1 per cent. They included $52,000,000 for railroad retirement and $57,000,000 for unemployment compensation.

The number of railway companies in receivership or trusteeship at the end of the year was the same as at the beginning, totalling 109 companies of all classes, which operate 77,414 miles of lines, or 31 per cent of the total railway mileage of the country. This number includes 39 Class I roads, one of which was added during the year, operating 75,114 miles of line, an increase of 666 miles during the year.

Purchases of materials and equipment from manufacturers, exclusive of fuel, totalled approximately $683,495,000 in 1939, as compared with $417,039,000 in 1938. Total purchases, including fuel, aggregated $942,379,000 in 1939, as compared with $656,817,000 in 1938.

### Other Indications of Progress

Many operating indices indicate further improvement in operating efficiency during 1939. The operating ratio for the year was 72.9 per cent, compared with 76.35 per cent for 1938 and 74.9 per cent for 1937.

The average speed of freight trains rose to the new high level of 16.7 miles per hour, as contrasted with 16.6 miles in 1938 and 16.1 miles in 1937.

The average movement per "active" freight car per day for the first ten months of 1939 (excluding surplus and unserviceable units) was 41.2 miles. It was 38.8 miles for the same period in 1938.

Freight locomotive fuel consumption averaged 112 lb. per 1,000 gross ton miles during the first ten months of the year, a new low record; this compares with 113 lb. for the same period in 1938 and with 117 lb. in 1937.

The average train load was 807 tons (first ten months), as compared with a corresponding average of 756 tons in 1938, and was the greatest in the history of the railways.

Gross ton-miles per freight train-hour exceeded all previous records in 1939, with an average of 32,704 (first ten months). This compares with 31,138 gross ton-miles per freight train-hour in 1938 and 25,837 in 1930.

On the whole, the high standard of operating safety which prevailed in 1938 was continued through 1939. The number of train accidents per million locomotive-miles for the first nine months was 2.9 per cent under the average for the corresponding months in 1938, and more than 50 per cent under the average for 1929. Eleven fatalities occurred to passengers in train accidents during the first three-quarters of 1939, compared with 52 for the same period in 1938.

During the first nine months of the year there were 66 fewer grade crossing accidents, 49 fewer fatalities and 73 fewer non-fatal injuries in such accidents than during the corresponding period in 1938.

The number of railway employees during 1939 averaged 989,000, which was an increase of 5.3 per cent over 1938, when the number of railway employees reached the lowest level since 1900. Total compensation paid employees was $1,858,000,000, compared with $1,746,000,000 in 1938, an increase of 6.4 per cent.

Owing to their somewhat better earnings, the total capital expenditures of the railways during 1939, for all purposes, showed a marked pick-up, being estimated at $375,000,000, compared with $226,937,000 in 1938. However, that these were still relatively small as compared with similar expenditures in earlier years, is seen in the fact that such expenditures for the eight years 1923 to 1930, inclusive, averaged $842,715,000 a year. Expenditures for additions and betterments to fixed property alone showed a considerable increase during the year, although the fact that they were only approximately one-third as large as the average expenditures for these purposes in the years 1923 to 1930, when they amounted to approximately $451,850,000, shows that they were far from adequate to meet the needs of the railways in the light of today's changing operating conditions.

Fifty-eight miles of new lines were built in the United States during 1939. This represents an increase over the 38 miles built in 1938, but, with the exception of that year and the years 1935 and 1932, when 45 miles and 24 miles, respectively, were built, it was the smallest mileage of new line construction in any year since 1930. The multiple-track mileage completed in 1939 totaled only 9.03 miles, of which 7.52 miles was constructed by the Norfolk & Western.

There was a small decrease in the mileage of lines abandoned during the year, the total being 1,783 miles, compared with 1,897 miles in 1938, but the mileage of lines taken up in 1939 has been exceeded in only four years since the record of abandonments was started in 1917. In the 23 years since this latter date, a total of 23,892 miles of lines have been abandoned, while only 10,530 miles of new lines have been constructed. This trend in the reduction of track mileage which cannot support itself on the basis of present or prospective earnings has also been evidenced throughout the year in continued campaigns on many roads to remove buildings and other facilities that are no longer required, campaigns that are resulting in large savings in maintenance and taxes.

## Maintenance Expenditures

Reflecting the increases in traffic and earnings which prevailed throughout 1939, there was an appreciable increase in expenditures for maintenance of way and structures during each month of the year, as compared with 1938, the total increase amounting to approximately $53,000,000, bringing the total expenditures for 1939 to approximately $473,000,000, compared with a total of $420,147,000 in 1938.

**Maintenance Expenditures 1917-1939**

| | | | |
|---|---|---|---|
| 1917 | $ 442,108,862 | 1928 | $837,905,747 |
| 1918 | 649,794,953 | 1929 | 855,354,867 |
| 1919 | 772,186,045 | 1930 | 705,470,940 |
| 1920 | 1,032,540,381 | 1931 | 530,612,890 |
| 1921 | 756,413,690 | 1932 | 351,179,041 |
| 1922 | 728,663,534 | 1933 | 322,335,022 |
| 1923 | 813,688,760 | 1934 | 365,285,353 |
| 1924 | 792,678,023 | 1935 | 393,642,261 |
| 1925 | 816,443,205 | 1936 | 454,842,407 |
| 1926 | 866,819,365 | 1937 | 495,593,913 |
| 1927 | 868,581,432 | 1938 | 420,147,125 |
| | | 1939* | 473,000,000 |

*Last two months estimated

While statistics are not yet available concerning the division of maintenance of way and structures expenditures among the various primary accounts, it is reasonable to assume that all of these accounts will show increased expenditures over those of 1938. However, the same statistics will also show unquestionably that the larger part of the increased expenditures in 1939 were on those facilities, such as main-line tracks and bridges, where the influences of safety and comfort of travel are involved, to the continued neglect of many other facilities and classes of work where these factors are less vital.

While the increased amount spent for the upkeep of the fixed properties during 1939 stood the roads in good stead in the face of the increased traffic which developed during the year, it is questionable whether it was any more than adequate to make good the increased current wear and tear on the property, leaving still much in the way of deferred maintenance as the result of the drastic curtailments in maintenance of way and structures expenditures since 1931. Just how much deferred maintenance there is in these properties, in dollar value, is difficult of exact determination, but studies indicate that in spite of the increased expenditures made during 1939, there still remains an accrued deficiency in maintenance to the amount of approximately a billion dollars.

## Rail and Tie Renewals

Like total expenditures for maintenance of way and structures, the outlays for both rails and ties were larger in 1939 than in 1938. As shown in one of the accompanying tables, the rails laid in replacement in 1939, as nearly as can be estimated at this time, totaled approximately 850,000 gross tons, compared with 598,752 tons in 1938, while the number of crossties used in

**Rails Laid in Replacements, Class I Railroads**

| | Gross Tons | | Gross Tons |
|---|---|---|---|
| 1925 | 1,950,146 | 1932 | 394,536 |
| 1926 | 2,209,873 | 1933 | 403,254 |
| 1927 | 2,124,765 | 1934 | 631,093 |
| 1928 | 2,080,277 | 1935 | 582,794 |
| 1929 | 1,958,489 | 1936 | 921,298 |
| 1930 | 1,517,002 | 1937 | 1,029,861 |
| 1931 | 984,900 | 1938 | 598,752 |
| | | 1939 | 850,000* |

*Estimated

renewals in 1939 approximated 44,000,000, as contrasted with 41,363,224 in 1938. Sizable as these increases were in both cases, they appear small when compared with the marked drop in renewals that occurred between 1930 and 1935.

Admittedly, many practical difficulties are encountered in any attempt to evaluate the extent of the deficiency which has accrued in rail and tie renewals, but, giving full consideration to the smaller volume of traffic in recent years, and to all of the various practices that have been developed for prolonging the service life of rails and ties, it would appear that there still remains a deficiency in rail renewals of some 3,000,000 tons, and in tie replacements of at least 90,000,000 ties, which must be made up eventually to put the tracks of the railways in first-class condition.

**Crossties Applied in Renewals, Class I Roads**

| | | | |
|---|---|---|---|
| 1925 | 82,716,674 | 1932 | 39,190,473 |
| 1926 | 80,745,509 | 1933 | 37,295,716 |
| 1927 | 78,340,182 | 1934 | 43,306,205 |
| 1928 | 77,370,491 | 1935 | 44,351,900 |
| 1929 | 74,679,375 | 1936 | 47,361,015 |
| 1930 | 63,353,828 | 1937 | 47,729,538 |
| 1931 | 51,501,659 | 1938 | 41,363,224 |
| | | 1939 | 44,000,000* |

*Estimated

Where there have been deficiencies in rail and tie renewals, it is a certainty that there have been even greater proportionate deficiencies in the maintenance of many of the other items included in the maintenance of way and structures account, because it is a well known fact that in view of the important bearing of rail and tie conditions upon safety and smooth operation, they have been given preferred consideration in the division of maintenance of way allotments. For example, many branch-line tracks need rehabilitation, almost out-of-face, and much building repair work and painting, long neglected, must be given attention soon to forestall the much larger repair costs which will be encountered with continued neglect.

That the railways are becoming increasingly committed to the use of power tools and work equipment for carrying out maintenance of way and structures work, and have large unfilled needs for such equipment to continue their programs of economy in maintenance methods, is seen in the fact that, concurrent with the better earnings throughout 1939, they continued to buy additional units of equipment on an increasing scale, total purchases amounting to approximately 3,550 units, as compared with 1,376 units purchased in 1938 and 3,310 units purchased in 1937. In part, these purchases, which are detailed in an article beginning on the following page, comprise those for the replacement of older units, and in part they reflect an expansion in the use of equipment to meet new needs and new conditions.

### Better and Faster Service

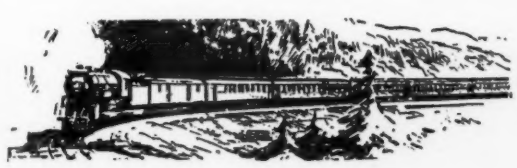
Continuing the trend of recent years, 1939 was characterized by the extension of high-speed train schedules into many new areas, providing not only faster service, but greater comforts and increased convenience in rail transportation. Altogether, 20 new streamlined trains were added in 1939 to the already large list of luxury liners in operation, bringing the total of such trains to 82. Supplementing the improved schedules and service afforded by these trains, the railways also improved their passenger service during the year by the installation of 13 new trains embodying modernized equipment, some of these operating on streamliner schedules. Furthermore, indicative of the continuing trend toward faster and better passenger service, is the fact that eight additional new trains are being built at the present time.

At the same time, there has been a consistent tightening up of the schedules of most freight trains, many of which are now operated at former passenger train speeds. Outstanding in this class of service, and, undoubtedly, the forerunner of other similar service, is the Challenger merchandise service inaugurated by the Union Pacific in the spring of 1939, a service involving new features of freight car construction, first-morning deliveries at points up to 450 miles distant, and average overall speeds as great as 40 m.p.h. All of these improvements in passenger train equipment and schedules, as well as the general trend to speed up trains with conventional types of locomotives and cars, have brought about increased demands for a stronger track structure, greater refinement in line and surface, and an improved standard of maintenance generally.

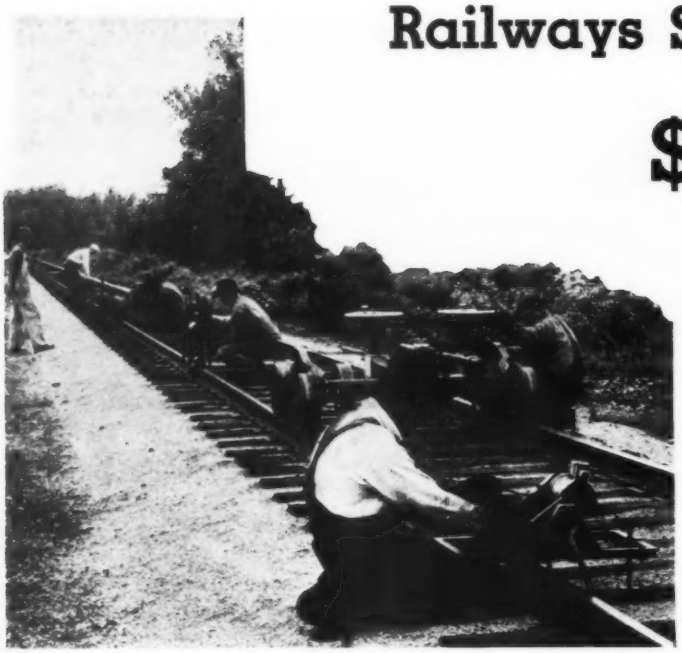
With these improvements have come also increased demands from the public for the modernization of passenger station facilities at many points, in harmony with the improved passenger service which is being afforded. Similarly, improved passenger and freight service is demanding the alteration or modernization of many yard, terminal and line facilities, including track layouts, shops, inspection pits and fuel and water stations, all in the interest of continuing this improved service with the greatest efficiency and economy.

### What's Ahead in 1940

That there will be a continuation of the trend toward better, faster and more efficient passenger and freight service in 1940 is a certainty. That this, in turn, combined with a traffic volume equal to or greater than that of 1939, will make more pressing already insistent demands for additions to and improvements of the railways' fixed properties and higher standards of maintenance, is equally certain. How far this trend and these resulting demands will go are questions which the events of the year alone can answer; events which, under existing international and domestic conditions, can have sudden and far reaching effects. Whatever may come, however, it is certain that the railways, without further restraint or interference, will meet any demands made upon them. Furthermore, it is certain, as has been demonstrated time after time in the past, and again in 1939, that with further improvement in earnings, the railways will continue on a larger scale to make those expenditures for roadway and other facilities necessary to provide still better and more economical service.



# Railways Spent $6,000,000 for Roads Demonstrate Their Needs by When Money



Many Types of Rail Grinders and Electric Welding Units Were Among the Purchases Made

THE railways have again demonstrated that they are not only willing but anxious to buy work equipment to the limit of their resources by purchasing 3,547 power machines and tools in 1939, at a cost of more than $6,000,000. While the magnitude of these purchases is arresting, the most striking fact is that they followed four years of relatively heavy purchases of similar equipment. Furthermore, although most roads have not completed their budgets for 1940, there are already definite indications of a large unfilled need for still more equipment, for in sending in the information from which this record is compiled, not a few roads also listed the number of units of work equipment they expect to purchase in 1940 and it is of interest that with no exceptions, these lists included more equipment than was purchased by each of these roads in 1939.

### Wide Range of Types

Both the magnitude and the diversity of these purchases in 1939 are noteworthy, for they compare with 1,376 units purchased in 1938 and with 3,310 units in 1937, up to then the year of largest purchases since 1929. Indicating the wide range of the application of power machines and tools to maintenance-of-way work, the list of units purchased in 1939 includes no fewer than 125 types and ranges, from pile drivers, 40-ton locomotive cranes, spreader-ditchers and large ballast-cleaning machines, to small portable bridge and building power tools.

A study of this list also discloses the progress that has been made in the mechanization of the maintenance-of-way forces, not only during the entire quarter of a century since power machines for maintenance-of-way purposes first became available, but even during the last decade, despite the severe restrictions imposed on purchases by reason of reduced earnings. Such a study will reveal many machines that were not available as recently as 10 years ago; some that were available but that had not yet been applied in maintenance; and others that have been greatly improved in design and efficiency; while one cannot fail to note the increasing number of roads that are purchasing work equipment.

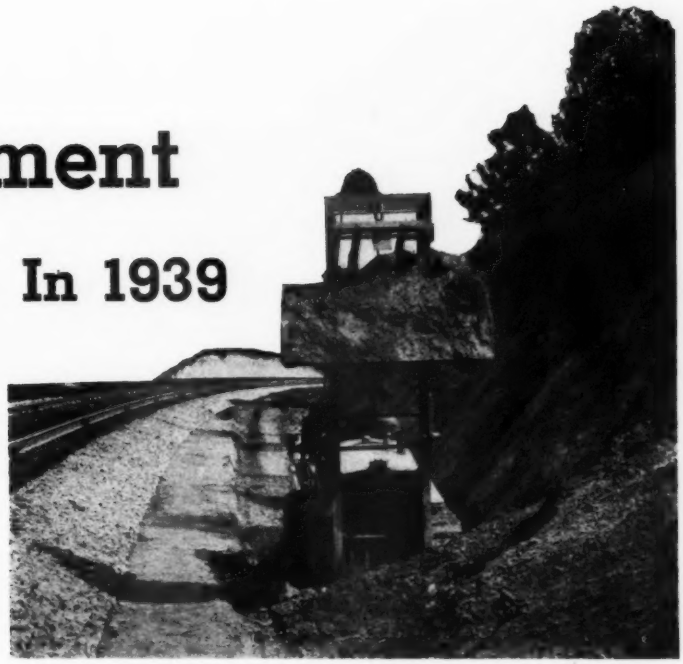
To obtain the information that is given in detail on the following pages, inquiry was made of all of the roads in the United States, Canada and Mexico as to their purchases of work equipment, and replies were received from 508 railways, including all but two of the Class I roads. Of this number, 124 reported that they had purchased work equipment during the year and listed their purchases. This compares with 81 that made similar purchases in 1938 and with 119 in 1937.

One of the most obvious disclosures of the list which follows is that the use of work equipment is expanding, for purchases were reported by a number of roads that have not heretofore used power machines of any type, while those roads that are most experienced in their use were large purchasers. Again the list includes a number of roads, the officers of which said no longer than five years ago that they had all of the work equipment they needed or could use; yet some of them were among the large purchasers of power machines and tools in 1939. Furthermore, the recent advance in wages that was granted to maintenance-of-way employees is exerting an influence on the attitude of maintenance-of-way officers with respect to the use of work equipment, for it has brought certain types of power machines into the picture, which many officers have believed could not be justified economically. In fact, it is making the use of all types of work equipment more attractive.

It is obvious to any one who has followed the development of the use of power machines and tools in maintenance that, despite the astonishing expansion in this use which can be observed on every side, as yet no road has all of the work equipment it needs or that its officers desire to possess, while many roads fall far short of this objective. In other words, despite the large number of units that have been purchased during the last five years, the amount of this equipment in use is no criterion of its ultimate possibilities, for these data show that the use of power machines is still expanding, even on those roads that possess the largest number of units, and that it will continue to do so for some years to come, as maintenance officers realize more fully the advantages of mech-

# Work Equipment In 1939

## The Magnitude of Buying Heavily Is Available



Tractors for Widely Diversified Purposes in Maintenance of Way Work Are Gaining Favor

anizing their operations. Furthermore, as this expansion continues, there will also be created a large and stabilized demand for the replacement of worn-out and obsolete units and for repair parts, a trend that is already discernible.

### Replacements Needed

In this connection two facts stand out clearly. While the purchases that were made in 1939 point unmistakably to an expanding use of power machines, they also show as clearly that not a few of the units were purchased for replacement purposes; in fact, some roads reported definitely that this was the purpose of some of their purchases while the remainder were classed as additions. Two other features of this list cannot escape the notice of those who study it. The first is the unusual number of the larger and more expensive machines that were purchased in 1939, compared with previous years, and the continued purchases of small portable power tools, together with the electric generators or air compressors necessary to operate them.

In general, the replies indicated a definite trend toward modernization, for with few exceptions the units that were purchased for both additions and replacements were of the most modern designs, such as two-stage air compressors in place of the older straight-line type, the latest designs in welding equipment and Diesel-powered tractors. Probably the strongest indication of this trend toward modernization is shown by motor cars, for this is a type of equipment which is used almost universally and of which the railways had a surplus as recently as five years ago. Yet, largely because of obsolescence, the reporting roads purchased 1,533 units of this equipment. While a considerable number of these cars were of the heavy-duty type, reflecting an increase in the number of extra gangs employed during the year, the majority were light-section and inspection cars which were purchased to replace the heavier cars of these types that are no longer suitable for the smaller section gangs or for inspection service.

As a further indication of the trend toward modernization of the power equipment in use, as well as of a wider use of this equipment to meet the demands imposed by increased activity in track maintenance, the railways purchased 379 complete tie-tamping outfits (large and small) in 1939, and 133 tie-tamping tools. A study of these purchases also indicates a definite trend toward the use of smaller and lighter outfits for small gangs.

Another trend that is partly along the lines of modernization and partly the result of changing methods of doing work, is shown by the large purchases of small power tools and of electric generators and air compressors to operate them. During 1939, the railways purchased 41 generators and 47 compressors, most of the latter being of the two-stage design. While some of the compressors were intended for replacement, practically all of the generators were for additions. These power plants were intended for operating small tools, and are not included in those purchased for tie-tamping or welding, or in connection with portable electric lighting plants. In addition, 17 engine-driven power plants for the operation of small tools were purchased.

It is not possible to state exactly the number of portable power tools that were purchased, as a number of roads merely reported complete sets of this equipment, without specifying the number or kind of tools. However, in addition to these sets, the remaining roads listed 371 such tools, including power saws, wood borers, hammers, drills, grinders, wrenches, chipping and scaling tools, rotary brushes, rivet hammers, as well as separate portable wood-working outfits consisting of band saws, planers, gainers, etc.

### Tractors Finding Favor

Less than 10 years ago a survey disclosed that the railways owned only 12 tractors and that several of these were employed by the stores and mechanical departments for moving cars and dead locomotives. As further evidence of the changing practices in maintenance, the railways purchased 22 tractors for maintenance of way use alone in 1939, not including several for mounting air compressors. To increase the range of their usefulness, 28 units of incidental equipment, of 11 different

More Power Bridge Tools Were Ordered

types, were purchased in connection with these tractors, including angle and bulldozers, graders, loaders, sweepers, plows, etc. In addition, two tractors with mowing attachments were purchased.

Although cranes represent one of the oldest types of work equipment, except pile drivers, of which two were purchased in 1939, few roads have as many of these machines as they require for the effective prosecution of their work. Furthermore, most of those they do own are obsolete in design and many are approaching the end of their service life. In view of the need for this equipment, it is surprising that only 20 cranes were purchased in 1939, including 4 locomotive cranes and 6 rail cranes.

During the last decade there has been little need for earth-moving equipment, except for ditching. Indicating a revival of interest in this equipment, 17 excavating units, including 4 draglines, 7 power shovels and 6 combination cranes, shovels and draglines, were purchased in 1939. In addition, 16 buckets for draglines, shovels and cranes were purchased separately. It is significant that all of the excavating units and 10 of the cranes were crawler mounted.

A continuation of the trend that has developed somewhat rapidly in the last three or four years, is seen in the purchase of 16 passenger automobiles, 117 motor trucks and 41 highway trailers. Motor trucks have been employed for a number of years to distribute maintenance of way materials in congested terminals, but it is only recently that their use has been extended to points out on the line, the purchase for which almost all of those purchased in 1939 were intended.

Indicating that more attention is being given to the appearance of the right of way than it has received for several years, the railways purchased 50 weed-destroying units in 1939, including 32 mowing machines, 9 weed burners and 9 discers.

The detailed list of work equipment purchased in 1939 by all of the railways, except the two Class I roads mentioned, follows:

## United States

**Alaska**
- 5 Motor cars, section

**Algers, Winslow & Western**
- 1 Motor car, section

**Alton**
- 6 Motor cars, inspection

**Ann Arbor**
- 1 Grinder, rail

**Artemus-Jellico**
- 1 Motor car, section

**Atchison, Topeka & Santa Fe**
- 1 Concrete mixer
- 2 Electric arc welders
- 2 Grinders, frog and switch
- 2 Jacks, power
- 102 Motor cars, section and inspection
- 2 Pile drivers
- 1 Portable electric lighting plant
- 1 Pump, portable
- 3 Tie adzers
- 1 Tie tamping outfit

**Atlanta & Saint Andrews Bay**
- 1 Motor car, inspection

**Atlanta & West Point**
- 1 Grinder, rail
- 2 Motor cars, heavy duty
- 1 Motor car, inspection
- 1 Motor car, section
- 1 Shovel, power

**Atlanta, Birmingham & Coast**
- 1 Drill, rail
- 1 Motor car, inspection
- 11 Motor cars, section

**Bangor & Aroostook**
- 1 Concrete vibrator
- 2 Drills, electric
- 1 Drill, power rail
- 1 Grinder, electric bench
- 1 Generator, electric
- 2 Jacks, hydraulic
- 1 Motor car, inspection
- 4 Motor cars, section
- 1 Pump, portable centrifugal
- 1 Saw, electric

**Belt Railway of Chicago**
- 1 Paving breaker
- 1 Pump, portable centrifugal

**Bessemer & Lake Erie**
- 1 Bolt tightener
- 1 Drill, power bonding
- 1 Jack, power
- 9 Motor cars
- 2 Rail and flange lubricators
- 1 Tie boring machine
- 2 Tie tamping outfits
- 6 Trailers, motor cars

**Birmingham Southern**
- 1 Drill, electric
- 1 Motor car, section
- 1 Welding outfit, electric

**Boston & Maine**
- 2 Automobiles, beach wagon
- 3 Automobiles, passenger
- 5 Motor cars, section
- 3 Motor trucks
- 1 Mowing machine
- 1 Portable electric lighting outfit

**Buffalo Union-Carolina**
- 1 Motor car, section

**Butte, Anaconda & Pacific**
- 1 Motor car, heavy duty
- 4 Motor cars, section

**Cadiz**
- 1 Motor car, section

**Cambria & Indiana**
- 1 Motor car, section

**Canton**
- 1 Bucket for power shovel
- 1 Snow sweeper, rotary

**Carolina & Northwestern**
- 1 Weed burner

**Central of Georgia**
- 2 Bolt tighteners
- 7 Motor cars
- 2 Rail and flange lubricators

**Central of New Jersey**
- 1 Saw, portable power
- 1 Wrench, impact

**Charleston & Western Carolina**
- 1 Air compressor
- 1 Drill, pneumatic
- 1 Grader for tractor
- 1 Motor car, inspection
- 1 Tractor, crawler mounted

**Chattahoochee Valley**
- 1 Motor car, inspection

**Chesapeake & Ohio**
- 2 Air compressors
- 2 Bolt tighteners
- 2 Buckets, excavating
- 2 Cranes, crawler mounted
- 1 Dragline
- 1 Drill, pneumatic
- 4 Drills, power rail
- 2 Grinders, rail
- 5 Motor trucks
- 1 Pump, centrifugal
- 1 Rail crane
- 2 Rivet cutters
- 1 Rivet holder-on
- 16 Scraping hammers, pneumatic
- 40 Scraping tools, pneumatic
- 6 Tie boring machines
- 1 Tractor excavator
- 1 Wrench, impact

**Chicago & Eastern Illinois**
- 6 Brushes, wire
- 2 Drills, electric
- 1 Generator, electric
- 2 Grinders, rail
- 4 Hammers, scaling
- 5 Motor cars, inspection
- 6 Motor cars, section
- 1 Saw, electric chain
- 1 Woodworking machine, portable

**Chicago & Illinois Midland**
- 1 Air Compressor
- 2 Generators, electric
- 2 Paint spray guns
- 14 Tie Tamping outfits

**Chicago & Western Indiana**
- 1 Generator, portable
- 1 Paving breaker
- 1 Pump, portable centrifugal
- 1 Rail crane

**Chicago, Burlington & Quincy**
- 1 Bolt tightener
- 2 Buckets, clamshell
- 1 Bulldozer
- 1 Concrete vibrator
- 2 Diggers, clay
- 2 Drills, power
- 1 Drill, rail
- 1 Front end loader
- 1 Generator, electric
- 1 Hammer, riveting

2 Jacks, air power
1 Motor car, heavy duty
50 Motor cars, inspection
16 Motor cars, section
2 Pumps, portable
1 Rivet buster
1 Saw, power
2 Snow plows for spreader ditchers
4 Tie tamping outfits
4 Tie saws
6 Trailers
9 Weed mowers
4 Wrenches, impact
1 Wrench, power

**Chicago Great Western**
8 Motor cars, inspection
7 Motor cars, section

**Chicago, Milwaukee, St. Paul & Pacific**
2 Air compressors
7 Bolt tighteners
4 Buckets, clamshell
4 Generators, portable electric
10 Motor cars, heavy duty
80 Motor cars, inspection and section
1 Road roller
1 Shovel, crawler mounted
1 Tractor with mower attachment
20 Trailers, motor car

**Chicago, Rock Island & Pacific**
2 Ballast discs
1 Crane
2 Draglines
1 Grinder, rail
15 Motor cars, heavy duty
23 Motor cars, inspection
27 Motor cars, section
4 Mowing machines
3 Paint spraying machines
4 Tie tamping outfits

**Clinchfield**
6 Motor cars, section

**Colorado & Wyoming**
1 Motor car, section

**Danville & Western**
1 Motor car, heavy duty
1 Power shovel and crane combination, crawler mounted

**Delaware & Hudson**
3 Motor cars, inspection
2 Motor cars, section

**Denver & Rio Grande Western**
1 Angle dozer
1 Bulldozer
1 Combination power shovel and dragline
77 Motor cars, inspection and section
2 Pumps, centrifugal
4 Spike drivers
1 Spikepuller
1 Tie tamping outfit

**Denver & Salt Lake**
1 Concrete mixer
1 Concrete pump

**Detroit Terminal**
1 Motor truck cab

**Detroit, Toledo & Ironton**
3 Motor cars, heavy duty
4 Motor cars, section

**Duluth & Northeastern**
1 Welding outfit, electric

**Duluth, Missabe & Iron Range**
2 Bolt tighteners
1 Drill, power rail
5 Motor cars, heavy duty
2 Motor cars, inspection
6 Motor cars, section
2 Rail and flange lubricators
1 Rail laying machine
1 Snow loader
5 Tie tamping outfits

**Duluth, South Shore & Atlantic**
1 Motor car, inspection
1 Motor car, section

**Duluth, Winnipeg & Pacific**
1 Combination shovel, crane and dragline
2 Motor cars

**East Washington**
1 Tank for chemical weed sprayer

**Elgin, Joliet & Eastern**
1 Air hoist
1 Concrete mixer
1 Drill, electric
4 Drills, pneumatic
1 Drill, pneumatic rock
1 Grinder, power rail
2 Hammers, chipping
1 Hammer, power
9 Motor cars
1 Power drive
2 Pumps, centrifugal
1 Rivet buster, pneumatic
1 Sander plane

**Erie**
1 Automobile, passenger
1 Boring machine
1 Concrete vibrator
1 Demolition tool
2 Drills, rail
2 Drills, portable electric
4 Motor cars
3 Motor trucks
1 Saw, air cutoff
1 Saw, electric band
1 Saw, power
2 Spike drivers
2 Welding outfits
5 Wrenches, impact

**Florida East Coast**
2 Bolt tighteners
1 Motor car, inspection

**Fredericksburg & Northern**
1 Motor car, heavy duty

**Georgia**
1 Motor car, heavy duty
1 Rail and flange lubricator

**Great Northern**
6 Angle dozers
2 Automobiles, passenger
8 Bolt tighteners
1 Bucket, clamshell
2 Buckets, dragline
1 Bucket, multiple rope
6 Carryall scrapers
5 Concrete mixers
2 Concrete buggies
16 Drills
4 Drills, rail
4 Generators
1 Gravel conveyor, portable
4 Grinders, bench
12 Grinders, rail
4 Hammers
1 Heat gun
2 Hoists, engine driven
3 Joint oilers
3 Motor cars, heavy duty
70 Motor cars, inspection
36 Motor cars, section
12 Motor car bodies
40 Motor trucks
2 Paint spraying outfits
1 Portable electric light plant
15 Pumps, centrifugal
14 Rail and flange lubricators
2 Revolving scrapers
13 Saws, power
2 Shovels
5 Spike pullers
1 Surfacer
3 Tie adzers
15 Tie tamping outfits
24 Tie cutting machines

**Rail Cranes Are Widely Used**

6 Tractors
1 Tractor plow
10 Trailers, motor truck
1 Weed burner
6 Weed mowers
1 Welding outfit
3 Wrenches, power

**Gulf Coast Lines**
2 Air compressors
8 Motor cars, inspection
2 Portable electric power plants

**Illinois Central**
6 Bolt tighteners
4 Drills, power bonding
4 Drills, power track
1 Fresno
1 Grinder, power rail
1 Light plant
50 Motor cars
5 Pumps, centrifugal
3 Rivet busters
1 Road grader
1 Saw, power hack
2 Spike pullers
21 Tie tamping outfits

**Illinois Terminal**
7 Motor cars, section

**International Great Northern**
1 Magnet equipment for rail crane
4 Motor cars, inspection
1 Portable electric power plant
1 Tie tamping outfit

**Interstate**
5 Motor cars, section
5 Push cars, section

**Jacksonville Terminal**
1 Drill, pneumatic
4 Rail and flange lubricators
2 Tractors

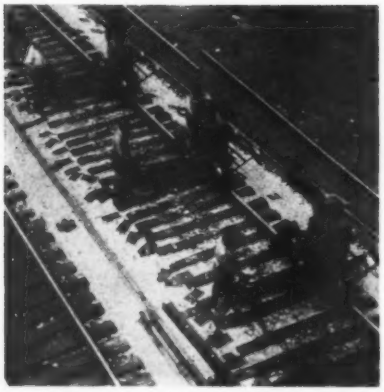
**Kansas City Southern**
2 Spike pullers

**Kentucky & Indiana Terminal**
1 Grinder, gasoline driven
2 Welding outfits

**Lancaster & Chester**
1 Motor car, heavy duty
1 Motor car, section

**Lehigh & Hudson River**
2 Motor cars
4 Tie tamping outfits

**Lehigh & New England**
1 Air compressor, portable
1 Motor car, inspection
3 Motor cars, section
1 Motor truck
4 Rail and flange lubricators



Mechanical Adzers Are Becoming Indispensible

**Lehigh Valley**
- 2 Automobiles, passenger
- 1 Ballast cleaner
- 2 Bolt tighteners
- 12 Motor cars, heavy duty
- 3 Motor trucks
- 40 Rail and flange lubricators

**Los Angeles Junction**
- 1 Motor car, inspection

**Louisville & Nashville**
- 1 Ballast discer
- 2 Concrete mixers, gas driven
- 2 Cranes, crawler mounted
- 9 Motor cars, inspection
- 30 Motor cars, section
- 2 Pile hammers, steam
- 1 Rail crane
- 4 Tie tamping outfits

**Maine Central**
- 2 Bolt tighteners
- 15 Motor cars, section
- 3 Motor trucks
- 1 Plow blade for motor truck
- 2 Portable electric light plants
- 3 Rail and flange lubricators
- 2 Snow plow attachments for tractors
- 2 Tractors
- 1 Wood boring machine

**Manufacturers' Junction**
- 1 Air drill

**Meridian & Bigbee River**
- 1 Motor car, section

**Midland Continental**
- 1 Shovel

**Minneapolis & St. Louis**
- 1 Jack, power
- 6 Motor cars, section
- 1 Tie tamping outfit

**Minneapolis, St. Paul & Sault Ste. Marie**
- 1 Motor car, heavy duty
- 8 Motor cars, inspection
- 7 Motor cars, section
- 1 Tie tamping outfit
- 1 Weed burner
- 2 Weed mowers

**Missouri & Arkansas**
- 2 Motor cars, inspection

**Missouri-Kansas-Texas**
- 2 Automobiles, passenger

**Missouri Pacific**
- 3 Air compressors
- 1 Bucket, clamshell
- 4 Concrete mixers
- 1 Concrete mixer engine
- 1 Concrete vibrator, internal
- 1 Concrete vibrator with spud
- 1 Dragline, crawler mounted
- 2 Drills, grinder
- 6 Drills, power
- 1 Generator, electric
- 1 Hammer, steam pile
- 1 Lag screw setter
- 1 Metalizing unit
- 1 Health unit
- 1 Sand ballast generator
- 11 Motor cars, heavy duty
- 67 Motor cars, inspection
- 38 Motor cars, section
- 1 Mower, power lawn
- 5 Paint spraying outfits
- 6 Pumps, portable centrifugal
- 6 Saws, power
- 42 Tie tamping outfits
- 1 Tractor, crawler mounted
- 1 Woodworking outfit

**Mobile & Ohio**
- 2 Grinders, portable rail
- 1 Jackhamer
- 2 Motor cars, inspection
- 13 Motor cars, section
- 6 Power units, engine driven
- 1 Power wrench
- 7 Rail and flange lubricators
- 4 Tie tamping outfits
- 1 Wood borer

**Monongahela**
- 4 Rail and flange lubricators

**Nashville, Chattanooga & St. Louis**
- 1 Bolt tightener
- 4 Tie tamping outfits
- 1 Weed mower

**Nevada Northern**
- 1 Motor car, heavy duty
- 1 Rail and flange lubricator

**Newburgh & South Shore**
- 1 Motor car, heavy duty

**New York Central System**
- 2 Ballast cleanders
- 1 Drill, power rail
- 1 Grinder, rail
- 8 Motor cars, heavy duty
- 5 Motor cars, inspection
- 11 Motor cars, section
- 3 Motor trucks
- 7 Mowing machines
- 1 Power unit, engine driven
- 6 Rail and flange lubricators
- 1 Saw, rail
- 2 Spike drivers, pneumatic
- 1 Tie borer
- 130 Tie tamping outfits
- 1 Tractor with mowing attachment

**New York, Chicago & St. Louis**
- 1 Boring machine with power unit
- 2 Grinders, rail
- 4 Motor cars, inspection and section
- 2 Rail and flange lubricators
- 1 Saw, portable electric
- 2 Tie tamping outfits
- 1 Welding outfit

**New York, New Haven & Hartford**
- 3 Adzing machines
- 10 Air compressors
- 7 Automobiles, passenger
- 4 Bolt tighteners
- 5 Buses
- 4 Cranes, combination railroad and crawler mounted
- 1 Crane, crawler mounted
- 4 Cranes, locomotive
- 1 Crane, motor truck mounted
- 1 Motor car, heavy duty
- 15 Motor cars, inspection
- 37 Motor trucks
- 5 Power units
- 2 Saws, power rail
- 1 Scale test car
- 1 Shovel, crawler mounted
- 2 Tie cutters
- 20 Tie tamping outfits
- 1 Weed burner
- 1 Welding outfit, trailer mounted

**Norfolk & Western**
- 5 Air compressors
- 1 Bolt tightener
- 2 Concrete mixers
- 2 Concrete vibrators
- 1 Drill, bonding
- 5 Hoists, pull lift
- 2 Jackhamers
- 17 Motor cars
- 10 Paint feed tanks
- 4 Pumps, centrifugal
- 3 Rivet busters
- 4 Screw spike drivers
- 1 Spike puller
- 2 Tie tamping outfits
- 32 Tie tamping tools
- 1 Tractor with mower attachment
- 1 Welding outfit, electric
- 1 Well drill
- 1 Wrench, reversible impact
- 11 Wood borers

**Norfolk Southern**
- 1 Tie tamping outfit

**Oregon & Northwestern**
- 1 Weed burner

**Panama**
- 1 Hammer, steam pile
- 1 Motor car
- 7 Rail and flange lubricators

**Pennsylvania**
- 2 Bulldozers
- 6 Bolt tighteners
- 1 Concrete mixer
- 1 Crane, motor truck mounted
- 1 Crane, motor truck mounted with winches
- 2 Cranes, rail
- 2 Grinders
- 2 Motor cars
- 6 Motor trucks
- 1 Mowing machine for tractor
- 15 Power grinding cars
- 1 Snow plow for tractor
- 4 Spike pullers
- 4 Tie Adzers
- 1 Tractor
- 2 Track sweepers
- 1 Welding outfit, motor truck mounted

**Pere Marquette**
- 1 Bolt tightener
- 1 Crane
- 21 Motor cars
- 1 Motor car, inspection
- 9 Rail and flange lubricators
- 1 Spike puller
- 4 Tie borers
- 16 Tie tamping outfits

**Pittsburg & Shawmut**
- 1 Motor car, heavy duty
- 1 Motor car, section

**Port Townsend Southern**
- 1 Motor car, section

**Quincy**
- 1 Motor car, section

**Raritan River**
- 1 Motor car, section

**Reading**
- 1 Bolt tightener
- 1 Paint spraying outfit

**Richmond, Fredericksburg & Potomac**
- 2 Motor cars, inspection
- 3 Motor cars, section

**St. Louis-San Francisco**
- 2 Bolt tighteners
- 1 Motor car, heavy duty
- 9 Motor cars, inspection

5 Motor cars, section
17 Rail and flange lubricators
1 Scythe, power driven

**St. Louis Southwestern**
1 Bolt tightener
1 Drill, post
1 Generator, portable
1 Grinder, rail
2 Grinders, power tool
2 Motor cars, heavy duty
1 Motor car, inspection
1 Motor, electric
1 Pump, centrifugal
2 Saws, portable electric
1 Saw, power driven
2 Spike pullers
12 Tie tamping outfits
1 Welding outfit

**Seaboard Air Line**
1 Grinder, rail
1 Saw, timber
2 Tie tamping outfits
2 Weed mowers
1 Wrench, impact

**Sierra**
1 Tie tamping outfit

**Southern**
6 Air compressors, skid mounted
4 Air compressors, tractor mounted
2 Concrete mixers
1 Drill, rotary corner
27 Drills, portable electric
16 Generators, gas driven electric
18 Grinders, portable pneumatic
3 Grinders, portable electric
1 Grinder, rail
2 Hammers, gasoline
1 Hammer, holder-on
10 Hammers, portable electric chipping
67 Motor cars
8 Paint spraying outfits
1 Pump, self-priming
1 Rivet cutter
1 Sand blast machine
16 Saws, portable electric
32 Scaling and chipping tools, portable pneumatic
1 Spike pulling machine
8 Tie adzers
11 Tie tamping outfits
4 Tractors
4 Trailbuilders
1 Wagon scraper
15 Wrenches, power

**Southern Pacific**
3 Bolt tighteners
2 Concrete placers
3 Diggers, clay
1 Lighting plant
31 Motor cars, various
4 Motor trucks
2 Paving breakers
18 Tie tamping outfits
101 Tamping tools

**Southern Pacific Lines in Texas and Louisiana**
1 Bolt tightener
2 Drills, pneumatic
1 Grader attachment for tractor
1 Jackhamer, pneumatic
43 Motor cars, various
1 Paint spraying outfit
2 Tractors
2 Truck derricks
2 Wrenches, power

**Spokane International**
4 Motor cars, section
1 Tie tamping outfit

**Spokane, Portland & Seattle**
1 Bolt tightener
2 Motor cars, heavy duty
9 Motor cars, section
1 Power shovel, combination dragline and crane
1 Spike puller
1 Tie adzer

**State Belt**
1 Welding outfit

**Stockton Terminal & Eastern**
1 Motor car, section

**Tennessee Central**
1 Jackhamer
2 Motor cars, inspection
1 Paint spraying outfit
1 Scaling tool
1 Tie tamping outfit
1 Wood borer

**Terminal Railway Alabama State Docks**
1 Motor car, section
1 Rivet hammer

**Texas & Pacific**
1 Drill, power rail
5 Motor cars, inspection
3 Motor cars, section
1 Rail crane
1 Spike puller
2 Tie tamping outfits
1 Track oiler
1 Weed burner

**Toledo Terminal**
2 Tie tamping outfits

**Tuskegee**
1 Motor car, section
1 Welding outfit, electric

**Union Pacific**
9 Air compressors
1 Battery charging set
14 Bolt tighteners
1 Bucket, dragline
6 Concrete mixers
2 Concrete vibrators
10 Drills, bonding
6 Drills, power rail
2 Drills, sinker
8 Emery wheels
1 Engine for replacement in spike puller
18 Jacks, pulling
5 Motor cars, section
15 Motor cars, heavy duty
22 Motor cars, inspection
2 Paint spraying outfits, portable
2 Paving breakers
1 Rock crusher
2 Saws, portable timber
6 Spike drivers, pneumatic
5 Spike pullers
3 Tampers, backfill
9 Tie adzers
5 Trailers, motor truck

**Union Railroad**
1 Drill, power rail
1 Grinder tool
1 Motor car
1 Wrecking derrick

**Virginian**
1 Bolt tightener
1 Front end loader
12 Rail and flange lubricators
12 Steel cleaning tools
1 Weed mower with turntable

**Wabash**
2 Automobiles, passenger
1 Bolt tightener
1 Digger, clay
1 Drill, reversible
1 Grinder
1 Jackhamer
2 Hammers, riveting
2 Paving breakers
4 Power units, portable
1 Rail cutter, power driven
1 Rail layer
1 Rivet buster
3 Roadbuilders with grousers
1 Scythe
1 Tie adzer
1 Tie cutter
22 Tie tamping outfits
1 Weed mower
1 Wood borer
2 Wood boring attachments for power units

**Western Maryland**
8 Motor cars, section
2 Motor trucks
3 Rail and flange lubricators

**White Pass & Yukon Route**
1 Air compressor with set pneumatic tools for bridge and building work and rock drilling

**Yadkin**
2 Motor cars, section

**Yosemite Valley**
1 Drill, electric
6 Floodlights
1 Generator

## Canada

**Canadian National**
6 Ballast discers
167 Motor cars
2 Pile drivers, self-propelling
1 Power shovel, combination dragline and crane
2 Spreader ditchers
1 Tie adzer
7 Weed mowers

**Canadian Pacific**
1 Engine for crawler crane
1 Grinder, rail
2 Grinders, stock rail
6 Motor cars, inspection

**Grand River**
1 Motor car, inspection

**Pacific Great Eastern**
1 Pump, self-priming centrifugal
3 Weed burners

**Quebec Central**
1 Motor car, inspection

**Toronto, Hamilton & Buffalo**
8 Tie tamping outfits

**Many New Motor Cars of All Types Were Purchased**

Modern Materials Made a Marked Improvement in This Station

# Meeting

By A. T. HAWK
Engineer of Buildings,
Chicago, Rock Island & Pacific,
Chicago

**During the decade that has just closed, traffic requirements and operating methods have changed more radically than in any equal period in railway history and are still occurring at an unprecedented rate. These changes have had and are still having repercussions on buildings that are almost bewildering. In this paper which was presented at the recent convention of the American Railway Bridge and Building Association, Mr. Hawk reviews the demands that these changes have already made on buildings and forecasts the future requirements with respect to building construction and maintenance**

WHEN it is considered that the railways of the United States and Canada have invested more than $1,680,000,000 in buildings, and that in normal times more than $92,000,000 is spent annually for their maintenance, in addition to $90,000,000 for their enlargement and improvement and for new structures, some idea is gained of the magnitude and importance of the building activities of the railways. To put it another way, the railways of North America use and maintain more than 360,000 buildings ranging in size and importance from a watchman's shanty at an isolated country highway crossing to the Grand Central terminal in New York.

These various buildings include no fewer than 100 different types, some of which are found in no other industry, each presenting problems peculiar to itself. It follows that there is an equally wide variation in design and in the details of construction and, particularly, in the classes of materials entering into these buildings, as well as in the equipment that must be installed and maintained. These problems have been complicated in recent years by the marked reduction in funds that have been available for maintenance and by the many changes that have taken place, and are still occurring, in traffic and operation.

Few, even among those who are intimately connected with railway building construction and maintenance activities, realize that the normal average life of railway buildings is only about 20 years. This does not mean that on the average, railway buildings are retired and torn down at the end of 20 years. It means that few buildings are allowed to remain in their original form longer than this; that changing conditions of traffic and methods of operation require that most of them be remodeled or enlarged, although many others *are* retired every year. This low average life results from obsolescence rather than because the buildings are worn out, despite the fact that most railway buildings are subject to especially severe service.

Railway buildings are erected to provide facilities for receiving, handling and delivering freight for the accommodation of passengers, to provide offices, to provide facilities for maintaining cars and locomotives, for servicing locomotives, for housing and distributing stores, for warehousing various commodities, for transferring freight from rail to water and vice versa, for pumping and delivering water for locomotive use, for housing employees, to house and maintain roadway equipment, and for a variety of other purposes.

Railway traffic, operation and maintenance are not static but are changing constantly. It is this constant change in methods and practices that tends to make many of these buildings obsolete long before they have attained their normal physical life. A building that is entirely adequate to meet today's requirements may be as fully unsuited for those of tomorrow. For these reasons, the activities of the building forces are those of erecting, rebuilding, remodeling, enlarging and tearing down structures of various kinds, as well as of maintaining the great variety of buildings in their care.

## Radical Changes in Last Decade

No period in railway history has seen so many or such radical changes in operating methods as have occurred during the last decade, or such marked changes in the methods of handling traffic. These changes have had their repercussions on buildings, some of which have been abandoned as traffic has fallen off; as departments or forces have been reduced or consolidated; or as methods have been revised. Some of these changes have required the alteration or enlargement of certain buildings; others have been put to new uses and have been remodeled. In not a few cases it has been considered expedient to consolidate existing facilities into as few units as possible, and this has required the elimination of some buildings, the remodeling or enlargement of others and the construction of still others.

There is no reason to believe that these changes will not continue in the future as they have in the past and as they are doing with such rapidity today. With this background let us consider how we are to meet today's requirements in today's structures. In giving this consideration, we must also look as far into the future as we are able, to insure, so far as it is

*Presented at the recent convention of the American Railway Bridge and Building Association, at Chicago.

# Today's Requirements In Railway Structures*

possible to do so, that we do not fall into uneconomical practices. As the first item, I would retire all surplus buildings, making sure, however, that there is no prospective use for them. To do this will be of advantage in several ways: First, it will eliminate the necessity for maintaining non-productive property; second, it will reduce the value of the property upon which taxes are assessed; and third, considerable material can be salvaged for use in maintaining other structures.

Funds available for building maintenance have been so restricted in recent years that we are confronted with a volume of deferred maintenance of such magnitude as we have never before faced. This is not confined to any one road or group of roads, but is general throughout the country. I do not believe, however, that many buildings that are in current use have been allowed to reach advanced stages of deterioration, although the appearance of some of them is far from attractive, partly by reason of deferred painting. Despite this there are today thousands of railway buildings that are in need of general repairs.

### Long Life for Roofs

Roofs have been patched and repatched until many of them can no longer be maintained with economy. Since the roof is one of the most important features of a building, it should be replaced with material that will have long life and low maintenance cost. To attain this result, however, the material must be of good quality, and I would use only the best. The use of cheap roofing materials is never economical, except for temporary structures. Where the pitch of the roof is low, the built-up roof of tar and gravel will meet both of these requirements if it is applied properly. For steeper pitches the built-up asbestos roof will probably give the best service.

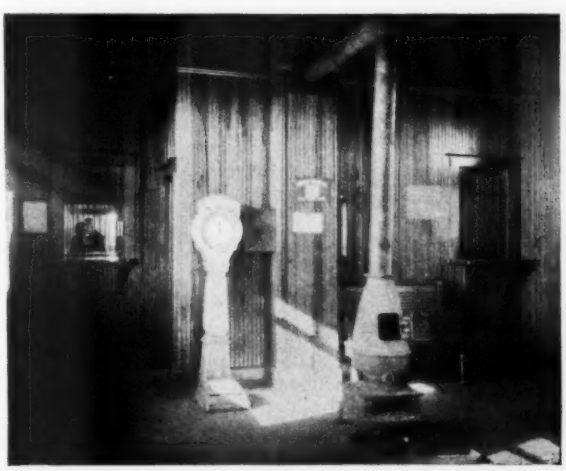
Roofing materials in great variety are available for use on pitches too steep for the built-up type. Asbestos shingles are probably best suited for use on the better class of buildings that have every prospect of being permanent. They are neat, easily applied and are fireproof, and possess the two requirements that have been stated—long life and low maintenance cost. The day of slate and tile roofs is about gone, except where they are desired for architectural reasons.

For the less important buildings, where a good appearance is desired, asphalt shingles can be used to advantage. They are low in first cost, have a reasonable life and can be maintained at small expense and with minimum effort. They are light in weight and are particularly adapted for use on frame buildings, and will give very satisfactory results on small stations and other buildings of comparable importance. Prepared roofing is a relatively low-cost material for many classes of buildings where appearance is of less importance, which are more or less temporary in character or where the use to which they are put does not justify more expensive materials.

It should be emphasized that despite reduced appropriations for buildings, only the best grade of roofing, whatever the class, should be used, except for temporary structures and those that will be retired within the life of the roof by reason of obsolescence or physical condition. The labor of installation is a large part of the cost of a roof, while the difference in cost between good and inferior roofing is almost negligible when the total cost of the roof is taken into account. The cost of maintaining good roofing is low, provided the workmanship is good; the maintenance costs of inferior roofing are always high. In this connection, since many roofing failures can be traced directly to poorly designed or poorly constructed flashing, the officer in charge should never assume that this part of the work has been done well—he should know without question.

### See to the Foundations

No building should be erected unless it is provided with an adequate foundation. Permanent buildings should have permanent foundations, regardless of the type of construction. Foundations for temporary buildings may be either temporary or semi-permanent, that is, the former may be of second-hand timbers, preferably creosoted, in the form of mudsills or posts, while the latter may be precast concrete piers that can be salvaged and reused when the building is dismantled. Foundations for frame buildings



**This Outmoded Waiting Room Could Be Made as Attractive as the One Shown at the Top of the Opposite Page, at Relatively Small Expense**

No Building That Is to Be Heated Should Be Allowed to Go Without Insulation

should be so designed that they will not be surrounded by filled material in such a way as to close off ventilation and thus create conditions favorable to decay.

When a frame building is erected or the lower members require renewal, creosoted material should be used for all members below the floor line, including sills, floor joists and sub floor. These members are more exposed to decay-producing conditions than others, and are usually the first to need renewal. Furthermore, this will insure in large measure against termite attack, a matter that must be watched more closely in the future, for many railway buildings are infested with these insects.

In this day of insistent demands for greater economy, no building that is to be heated should be allowed to go without insulation. This is emphasized, for the railways are far behind other industries with respect to the insulation of their buildings. When a building is constructed, insulation should be applied. When a structure is undergoing general repairs or remodeling, insulation can be applied to better advantage than at any other time, so far as existing buildings are concerned. Many types of insulation are on the market today, designed to meet every condition that may arise. The building officer is able, therefore, to select the type that is best adapted for the class of work he is doing. A word of caution is in order at this point. Insulation should be used only for the purpose for which it is designed, that is, to reduce the heat losses from the building; it should never be substituted for structural members.

Heating with stoves probably represents the most inefficient operation on a railway. Where a building is of such size or importance that a heating plant can be justified, one should be installed. It may be coal or oil fired; steam, hot water or hot air; and manually or automatically controlled. Where the building is not occupied continuously or there is no attendant, the hot-air equipment may be the safest, for there are no parts to freeze if it is not given attention.

### Toilets Need Renewal

Toilet facilities are generally more out of date than any other we are to consider. This is particularly true of passenger stations, in some of which conditions are little less than disgraceful. Relatively few stations today are equipped with modern plumbing, while many of the existing toilet rooms are finished in wood and are generally unsanitary. The railways are beginning to get back some of the passenger business they had lost to other forms of transportation, but to hold it they must provide decent facilities for their patrons, a thing that is not being done at many stations, where toilet rooms are poorly lighted, unclean and generally offensive.

Toilets for shops and other places where there are large groups of employees should be so located that they are easy of access, to reduce the time consumed in reaching them. The number of units should usually be somewhat in excess of state or municipal requirements, so that there will be ample accommodations during the rush period of the day.

Requirements for lighting are more exacting today than ever before, for poor lighting is decidedly poor economy. All buildings should be designed to take the fullest advantage of day lighting. Special attention should be paid to the arrangement, number and spacing of the lighting units, to simulate daylight as nearly as possible. Shadows and glare should be eliminated and the illumination made as nearly uniform as possible. While these principles should be followed in all buildings they are specially important in offices and shops, to increase the efficiency of the employees, and in the latter to increase safety. Advantage should be taken of the newer types of lighting equipment that are now available, both for the purpose of making the illumination more effective as well as to conserve the cost of the lighting current.

Much Reroofing Needs to Be Done

### Modernizing Passenger Stations

Turning to specific classes of structures or facilities, passenger stations comprise the largest group of railway buildings. It is through these stations that most of a railway's patrons have their contacts with the railway. Not infrequently the attitude of an entire community toward the railway will be favorable or unfavorable, depending on whether it is maintaining a neat, convenient and pleasing passenger station, or has allowed it to run down until it is a real eyesore.

In the last few years, a number of new materials such as plywood and others of a similar character, have come onto the market, that make it possible to modernize outmoded stations at relatively low cost, even where considerable remodeling is done. This form of rehabilitation, including the installation of modern sanitary lighting and heating equipment, can be done at a cost well under that for a new station, and will satisfy the civic pride of almost any community.

An opportunity to improve operating conditions and at the same time demonstrate large economies may be found at many engine terminals. At a terminal where all of the power is provided by steam, a change to electric power will, in most cases, pay a surprisingly large return on the investment necessary to make the change. After the change-over, electrically operated blowers will be used in firing up locomotives; air compressors, pumps and other power equipment will be motor driven; the cleanliness of the whole plant will be greatly improved, and there will be a material saving in floor space and maintenance costs. The boiler plant will be shut down for five or six months during the year and, when in operation, will carry the heating load only.

Despite the fact that the great majority of platforms today are of wood construction, and despite the further

fact that more platforms are being built of wood currently than of any other material, the day of the wood platform is passing. The cost of lumber is constantly increasing, while the quality is becoming more and more inferior. The service life of a wooden platform is less today than ever before, unless it was built at excessive cost for the material, for which reason maintenance costs are unduly high. Under these conditions there is no economy in the use of wood for platforms, even though the first cost of substitute materials is high by comparison. Where it is considered necessary to maintain a wood platform, the material should be creosoted. Concrete, brick and bituminous materials are available for platform construction and any one may be used, depending on the demands of the service performed.

There is an almost unlimited number of structures or groups of structures that might be discussed in the same vein, that have not been mentioned, such as icing plants, coaling stations, pumping and water-storage facilities, track scales, piers, wharves, warehouses, section tool houses and numerous others, all of which have been greatly affected by the changes in operating practices that have already taken place, in which the requirements today are vastly different from what they were as recently as 10 years ago. Enough of these facilities have been discussed, however, to show that the demands that are being made upon railway structures differ widely from those of previous years, and that the viewpoint of building officers must be revised so that they will have the proper perspective with respect to their duties in the new era of changing conditions into which we have entered.

### Must Keep Up to Date

Many of the ideas and practices that have been developed from previous experience are as outmoded by today's requirements for building construction and maintenance, as the wood-burning locomotive would be for pulling a streamliner. In other words, the building officer of today must reorient himself and start on a new basis. Where he has thought in terms of low initial cost, he must think in terms of long life and low maintenance cost. Where he has considered appearance as paramount he must give equal consideration to utility. Where second-hand materials were not considered to have value, salvage must be given much consideration. He must think more in terms of the new materials that are now available for his use and less in terms of the materials that he has always looked upon as the staples for his work. In short, he must accustom himself to new designs, to new forms of construction, to new requirements in buildings and to the use of materials with which he is now more or less unfamiliar. This does not mean that he must learn his trade all over again, but that he must be alert to understand these new requirements and flexible enough to meet them. Those who are unable or unwilling to do this, must stand aside for those who can and will do so.

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# Using Compressed Air in Bridge and Building Work*

**By C. R. Edwards**

Supervisor of Work Equipment and Scales, Wabash, Decatur, Ill.

FOR many of the operations performed by bridge gangs, and this is true to only a slightly less extent of building gangs, compressed air has the field to itself, for in these applications other forms of energy cannot compete with it and, so far as can be foreseen at present, are not likely to replace it. For many other operations electricity is a close competitor of compressed air, yet, while many strides have been made in the development of electrically-operated tools, pneumatic tools appear to be better adapted for the adverse conditions under which tools used by bridge gangs are operated, for in many instances the tools must be used in mud and water. In general, the conditions under which portable power-operated tools are used by the building gangs are much more favorable for electric tools, so that in this type of work their competition with compressed air is more active.

One of the serious disadvantages of compressed air, especially for work where the equipment must be highly mobile, is that of weight. I am convinced, however, that the time is not far distant when a light-weight, two-stage air compressor of ample capacity to meet the demands imposed on it by these classes of work, operated by a six or eight-cylinder gasoline engine, will be available. I am equally convinced that when this time comes, as it must if this form of power is to remain in the field for general use, such power plants and accessory tools will be standard equipment for bridge gangs and will be widely used by the building forces.

For bridge work, the jackhammer is of outstanding value, followed closely by the paving breaker or concrete buster. Among other compressed-air tools that are now or will be considered indispensable, because of their economic value, for bridge and building work I include equipment for applying shotcrete, rivet hammers, rivet busters, impact wrenches, pneumatic sheet-pile drivers, air hoists, paint sprayers, air for portable oil rivet-heating furnaces and for portable forges, power-operated chisels, pneumatically-operated hydraulic jacks and sand blasting. It will be noted that this list includes only such tools and devices as, in their present stage of development, must be operated exclusively by compressed air.

In addition to the foregoing there should be included close-quarter drills, drills for wood and metal, wood borers, pumps, portable saws, abrasive wheels, wire brushes and others. This group includes tools that can be operated satisfactorily by either air or electricity. If a gang is equipped with an air compressor, however, there is an obvious advantage in having all tools adapted for pneumatic operation.

With too few exceptions, the bridge and building forces have not kept pace with other maintenance of way forces in the use of power tools and equipment. Conditions today require that the work of this department be done on the same plane of economy as that of the other departments, for which reason the bridge and building department constitutes a fertile field for the extension of the use of power operated tools. The power-tool requirements of this department should, therefore, be given thoughtful consideration, for expenditures for such equipment will pay an ample return in increased economy and efficiency.

*This discussion was submitted for publication in the What's the Answer department in the April issue, in response to a question as to the advantages of compressed air for bridge and building work, but because of its comprehensive character it was withheld for presentation here as an independent article. For further discussion of this subject see page 248 of the April issue.

# Streamliner Derailment

## The Result of

# Sabotage

This Photograph of the Point of Derailment Shows How a Tie Plate Was Moved Inward Approximately 4⅝ In. and Fully Spiked

**As the result of an exhaustive inspection on its part, the Bureau of Safety, Interstate Commerce Commission, attributes the disastrous wreck of the streamliner "City of San Francisco," last August, with its large loss of life, to "malicious tampering with the track." The report of the Bureau, released on December 29, which is abstracted herewith, says that evidence is conclusive that a rail had been misalined before the accident occurred**

THE disastrous wreck of the Streamliner "City of San Francisco" near Harney, Nev., on the Southern Pacific on August 12, 1939, in which 24 persons were killed and 115 injured, was caused by "malicious tampering with the track." This is the conclusion reached by the Bureau of Safety of the Interstate Commerce Commission and incorporated in its report released on December 29, following its exhaustive investigation of this accident. All of the testimony at the Bureau's inquiry, including that of its own inspectors, pointed so directly to the fact that a joint in the high rail of the curve involved had been disconnected, the angle bars removed and the east end of the receiving rail moved inward about 4⅝ in. on the tie that the Bureau states that "evidence is conclusive that this rail had been misalined before the accident occurred." The following is abstracted from the Bureau's report.

The "City of San Francisco" consisted of three power units, an auxiliary power and dormitory unit, two chair units, two kitchen-diner units, one dormitory-club unit, seven Pullman sleeping units and one lounge unit, in the order named. This train departed from Carlin, Nev., 16 miles east of the point of accident, at 9:15 p.m., 29 min. late according to the train sheet, and 18 min. later was derailed.

### Damage Extensive

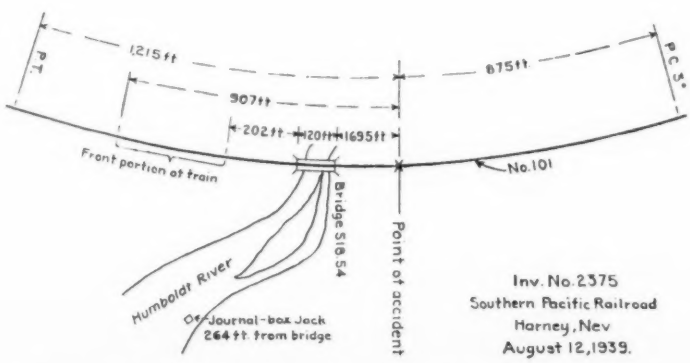
In the derailment, the three power units of the train and the two following cars passed over a bridge, on the ties, without becoming uncoupled, the head end stopping at a point about 907 ft. west of the point of derailment. The first power unit remained upright in position approximately 11 in. to the left of the line of track. Power unit No. 2, inclined at an angle of 15 deg. to the left, stopped with its front truck on the ties, about 12 in. to the left of the line of track, while the third power unit and the two following cars which crossed the bridge came to rest on the south side of the embankment, the power unit in a leaning position, and the other two cars on their sides.

The next two cars in the train, the combination diner-kitchen car and a diner, obviously engaged the truss members of the bridge in crossing it, collapsing the structure, and resulting in these two cars, together with the three following cars, being precipitated into the river bed. The next three cars of the train, all of which were derailed, stopped short of the bridge opening, and came to rest in leaning positions down the south face of the embankment. The next car, a sleeper, was derailed but stood upright on the track, while the last three cars in the train were not derailed.

### Well-Maintained Track

The accident occurred on the main line of the Southern Pacific at a point approximately 1.55 miles east of the station at Harney, Nev., and 169.5 ft. east of bridge No. 518.54. Approaching from the east, there is a tangent 437 ft. in length, followed by a 3-deg. curve to the right, extending 875 ft. to the point of derailment and 1,215 ft. beyond.

The track structure consists of 130-lb., P.S. section rail, in 39-ft.




Sketch of the Track Layout in the Vicinity of the Point of Accident

lengths, laid new in 1931 on 24 treated fir ties to the rail length. It is fully tie-plated with Lundie canted tie plates, which are corrugated on the bottom surface for secure grip on the ties. The intermediate plates are 8¾ in. by 10½ in. and have spike holes spaced 3½ in. between centers. The joint plates are 8¾ in. by 11 in. and have offset spike holes spaced 3½ in. between centers.

On the curve involved, there are four spikes per tie plate, two inside of the rail and two outside of the rail. The angle bars are 24 in. in length and have four holes each, the bolts used being secured by nuts and lock washers. The rail joints are bonded for signal circuits with two No. 8 galvanized wires, 52 in. in length, looped at each end, housed behind the angle bars and secured to each rail by channel pins which are spaced 28 in. apart. The track is laid on 12 in. of crushed rock ballast, is well maintained, and has superelevation at the point of accident of 4⅛ in.

Bridge No. 518.54 was a through riveted Warren truss span, 120 ft. long, which had recently been strengthened and was capable of carrying Cooper's E-50 loading. The bridge, which was equipped with 90-lb., second-hand guard rails, had a rail height of 33 ft. above the Humboldt river.

At the time of the accident, 9:33 p.m., the weather was clear and it was dark.

## Track Had Been Inspected

Testimony presented at the inquiry of the Bureau showed unusual agreement in the observations of employees on the wrecked streamliner, engineering and operating officers of the road, local citizens and the inspectors of the Bureau itself with regard to the track conditions which prevailed immediately following the accident, all having observed the condition directly at the point of derailment which led to the verdict of sabotage. Furthermore, the assistant division engineer on the territory involved testified that he had found no mark of derailment or indication of dragging equipment for a distance of about 1,000 ft. in advance of the point where the power units first left the rails. The roadmaster stated that his last inspection of the track involved was on the morning of August 11, the day before the accident, when he rode over it on a motor car. Ten days prior to the day of the accident, he said, a walking inspection had been made of the track, and in both instances the track at the curve involved was in excellent condition. The section foreman stated that he had been over the track in the vicinity of the point of accident on August 11 and he had found it in excellent condition at that time.

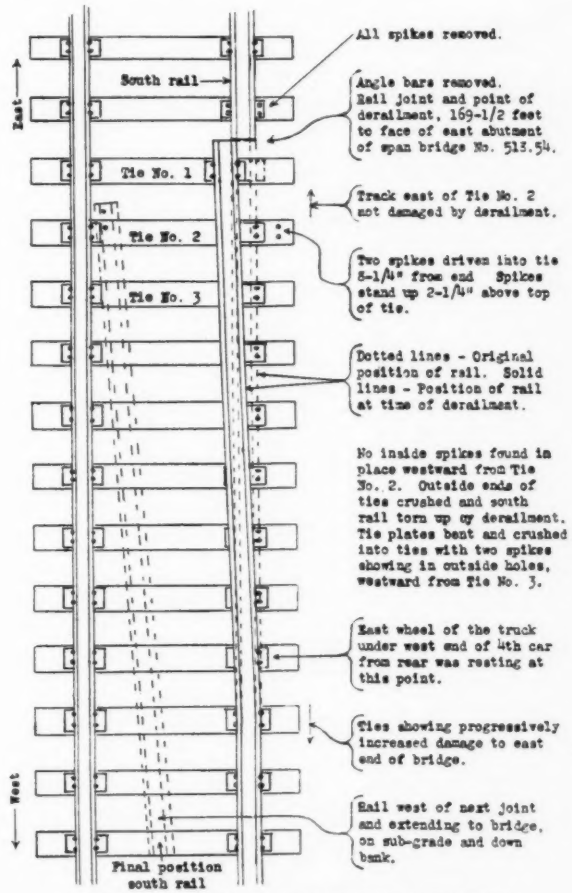
## Discussion of Evidence

Summarizing the testimony presented at its inquiry, the Bureau's report said as follows:

According to the evidence, train No. 101 (the "City of San Francisco") was not moving in excess of the maximum allowed speed of 60 m.p.h. when it became derailed. The train was riding smoothly and there was no indication of defective equipment.

Prior to the arrival of the train at the point of derailment, the track was structurally sound, was maintained in excellent condition, and the automatic block signals were displaying proceed indications. Upon entering the curve upon which the accident occurred, the engineman saw an object about 300 ft. distant, which later was found to be a tumbleweed lying on the south or high rail of the curve. When the train reached that point, the front truck became derailed and the engineman thought that a rock had been struck. Subsequent examination of the track disclosed that on the south rail the angle bars had been removed from a joint located 169.5 ft. east of Bridge 518.54, and the angle bars, bolts, nuts and tight-lock washers were lying adjacent to the disconnected rail.

Apparently a wrench had been used to remove the nuts, as none of the bolts were cut or broken. The joint tie plate on the first tie beneath the receiving end of the disconnected rail had been removed and an intermediate tie plate had been placed 4⅝ in. inward from the alinement of the south rail and fully spiked with four spikes. The position of this plate was not a result of the tie moving laterally under impact resulting from the derailment, as there was no indication in the ballast of any tie being moved from its original position.


East
West
South rail
Tie No. 1
Tie No. 2
Tie No. 3
Final position south rail
All spikes removed.
Angle bars removed. Rail joint and point of derailment, 169-1/2 feet to face of east abutment of span bridge No. 513.54.
Track east of Tie No. 2 not damaged by derailment.
Two spikes driven into tie 8-1/4" from end. Spikes stand up 2-1/4" above top of tie.
Dotted lines - Original position of rail. Solid lines - Position of rail at time of derailment.
No inside spikes found in place westward from Tie No. 2. Outside ends of ties crushed and south rail torn up by derailment. Tie plates bent and crushed into ties with two spikes showing in outside holes, westward from Tie No. 3.
East wheel of the truck under west end of 4th car from rear was resting at this point.
Ties showing progressively increased damage to east end of bridge.
Rail west of next joint and extending to bridge, on sub-grade and down bank.

**Sketch Showing the Normal, Misalined and Final Positions of the Rail at the Point of Derailment**

The tie plate had been misplaced, as the outline of the original plate seat on the tie was clearly defined, and the spike holes indicated fresh and recent disturbance of the wood fibre,

such as would follow the action of withdrawing a spike.

Of the four spikes holding the misalined tie plate, the two outside spikes were fully driven while the two inside spikes were found withdrawn a distance of 2.88 and 3.1 in., respectively, above the plate; this indicated a revolving lateral motion of the receiving rail which caused the inside spikes to be drawn sufficiently to permit the rail to roll free. The rail at the same time was being pushed westward because of the friction imparted to it by the pilot casting, a longitudinal movement of 10½ in. being sufficient to clear the spikes in order that the rail could be pushed laterally toward the north rail.

### Evidence of Sabotage Conclusive

The movement of the receiving rail inward 4⅝ in. provided a gap of approximately 1⅝ in., as the ball of the rail was 3 in. in width. The front wheel flanges, being 1-5/32 in. in thickness, could readily fit into the gap. As the misalined rail was on the high side of a 3-deg. curve, centrifugal force at 60 m.p.h. would throw the wheel flange tightly against the ball of the leaving rail and prevent the flange from riding over the ball of the receiving rail. Further observation disclosed that all four spikes in the plate at the end of the leaving rail had been drawn without disturbing the position of the rail or tie plate. All inside spikes on the south ends of at least nine ties following the point of derailment had been drawn. A dent on the end of the receiving rail at the top and on the south side of the ball indicated that the flange of a wheel had struck the end of this rail. There was a corresponding mark on the back of the flange of the left front wheel of power unit No. 1. There were no damaged angle bars or bolts, which would have been the case if the rail had been in proper alinement when the train approached. The evidence is conclusive that this rail had been misalined before the accident occurred.

The investigation developed that the receiving rail, after being freed by the removal of the angle bars and spikes, was pushed over by means of either a journal jack or track bar. It is probable that the former was used, as a jack was recovered from the river bed near the scene of the accident. After the accident, an unusual spike arrangement was found on tie No. 2, which would permit a journal jack to be placed between the spikes, driven 8¾ in. from the end of the tie, and the web of a rail in normal position. With the angle bars removed there would be sufficient slack in the signal bond wires at the rail joint to permit a rail to be moved inward about 16 in. before the bond wires would be broken; and a movement of only 4⅝ in. would be insufficient to disturb the circuit in such manner as to cause the block signals immediately east of the point of accident to display restrictive indications.

The ball of the misalined rail had been painted and a tumbleweed placed over the disconnected joint. As any irregularities of track alinement are clearly defined by the reflection of a headlight on the shining surface of the rails, it is reasonable to assume that these measures were taken so that the engineman of an approaching train would be unable to detect the damaged track condition thus camouflaged.

About three hours intervened between the passage of the last prior train and train No. 101. It was developed by tests that only a comparatively short time was required to disconnect a rail joint, draw the spikes, and realine a rail as had been done in this case.

When the power units became derailed on the curve, the first power unit traveled to the left a few inches, because of following a tangential line. However, the motor housings and the pedestal binder-bolts prevented the power unit from leaving the roadbed.

The conclusions of the Bureau were confined to the following single sentence:

"This accident was caused by malicious tampering with the track."

# Santa Fe Erects All-Welded Steel Tank

LARGER locomotives and larger engine tanks have created unusual demands on not a few water stations. This occurred at Newton, Kan., an important intermediate terminal on the Atchison, Topeka & Santa Fe, at which place the margin of safety of the service storage was being reduced to the point where additional storage became desirable. To correct this situation and to provide sufficient additional service capacity to care for the normal increase in water consumption, as well as to insure a sufficient supply to meet peak requirements, this road recently erected at Newton a 24-ft. by 60-ft., all-welded steel standpipe, which is one of the few all-welded water tanks in railway service. This form of construction was chosen because of its lower first cost and the belief that maintenance costs would be reduced.

Aside from the revisions in details that were necessary to make the change over from riveted to welded construction, there were no special features in the design of the tank, which is of the conventional flat-bottom, standpipe type, resting on a concrete foundation. However, one notices immediately the absence of angles at the connection between the floor and the shell, since this connection is made by welding the shell plates directly to the floor plates without any form of reinforcing, with the bottom plates projecting 2 in. beyond the exterior of the shell.

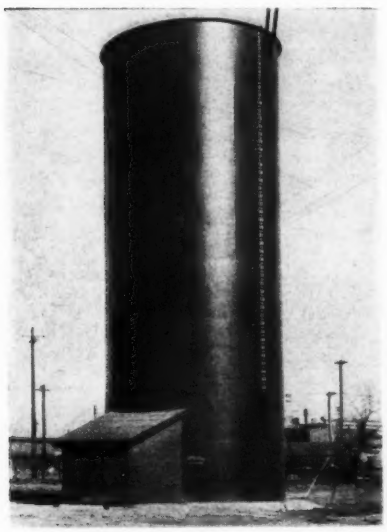
Another feature that attracts attention is the design of the floor plates. Instead of the heavy cumbersome riveted sections that usually accompany the material for a riveted tank, the floor was divided into nine parts, comprising four shapes, all of which were small and light enough for easy handling, and for assembly and welding in place. In this case, however, the assembly of the floor was made on a temporary support adjacent to the foundation, because the specifications under which the tank was erected required the application of a metal preservative to the underside of the floor after welding and before the erection of the shell was started.

The shell consists of eight courses of plates, each plate being 7 ft. 5½ in. wide and approximately 25 ft. long, with an allowance of ⅛ in. for the welding of all horizontal seams and of ⅛ in. to 5/32 in. for the vertical seams. At the top, the shell is finished with a 6-in. by 3½-in. by ⅜-in. angle, having the long leg horizontal. The vertical seams were staggered, and all joints, both vertical and horizontal, were butt welded, except the joint between the shell and the floor, where a fillet weld was necessary. The lower plates are 7/16 in. thick; this is reduced to 11/32 in. for the second course, and to 5/16 in. for the third course; and

all remaining courses are ¼ in. thick. All shell plates were rolled to a radius of 16 ft.

In the erection of the tank, the floor seams required 92 lin. ft. of welds; the horizontal seams between courses had a length slightly greater than 75 ft. each; and the vertical seams aggregated 23 lin. ft. to each course. Including the finishing angle, therefore, the erection of the tank involved the making of 879 lin. ft. of butt welds and 150 ft. of fillet welds. In addition, 79 lin. ft. of fillet welds were required in connection with pipe fittings, manhole, ladder, etc., making the total for all welds 1,108 lin. ft.

A frost box was constructed as a part of the concrete foundation to house a 10-in. inlet pipe from the treating tank, a 16-in. discharge line to the water columns and a 6-in. blow-off pipe to provide quick disposal of any sludge that may accumulate in the tank. These pipes enter the tank at elevations above the floor line of 3 ft. 9 in., 2 ft. 9 in. and 1 ft. respectively. Instead of being bolted to the shell by means of flanges and gaskets or of passing these pipes through glands, they were passed directly through the shell, to which they were welded by means of 7/16-in. flange plates, which were welded



**The All-Welded Tank is 60 Ft. High**

to both the shell plate and the pipe. Similar flanges 1-3/16 in., 1-7/16 in. and 1 in. thick, respectively, were welded to the ends of each of these pipes to facilitate connections with other sections of pipe.

While the blow-off pipe is expected to keep the tank free from accumulations of sludge, a paving of concrete, 14 in. thick, was placed in the bottom of the tank and sloped to a manhole 2 ft. in diameter, located in the shell, the bottom of which is 1 ft. above the floor. This will permit hand cleaning if this should become desirable, while the manhole provides easy means of access to reach the system of inlet and outlet pipes that have been mentioned. The tank is fitted with a ladder that does not differ from ordinary design, except with respect to the welded connections, and with a wood-float indicator.

One of the unusual features of the design is the small number of details shown on the drawings. The details of the tank, including the location, the kind and the length of the welds and the location of the pipes and manhole, are contained on three legal-sized sheets, while the details of the ladder, the pipe connections through the shell, the indicator, and a gin pole that was erected at the top of the tank, require four similar sheets. These details require so much space relatively because it was necessary to show fabrication dimensions for the various parts of the several assemblies.

The plans were prepared and the tank was erected by the Chicago Bridge & Iron Company, Chicago, under the direction of H. W. Wagner, chief engineer, Eastern Lines of the Santa Fe.

# New Books

## Railway Engineering and Maintenance Cyclopedia

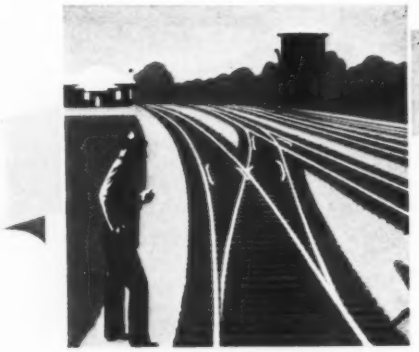
EDITED by Elmer T. Howson, editor, *Railway Engineering and Maintenance* and Western Editor, *Railway Age*, and C. Miles Burpee, managing editor, formerly research engineer, Delaware & Hudson, assisted by P. G. Lang, Jr., engineer of bridges, Baltimore & Ohio (Bridge Section), A. L. Sparks, architect, Missouri-Kansas-Texas (Building Section), C. R. Knowles, superintendent water service, Illinois Central (Water Service Section), and P. M. Gault, signal engineer, Missouri Pacific (Signal Section). 1016 pages, 2,000 illustrations. 8 in. by 11½ in. Bound in maroon fabrikoid. Published by the Simmons-Boardman Publishing Corporation, New York and Chicago. Price $5.

The 1939 edition of the Railway Engineering and Maintenance Cyclopedia is the fourth issue of a work which for more than eighteen years has been accepted and approved as the outstanding guide to efficient maintenance of way practices. Published with the co-operation of the American Railway Engineering Association and the Signal Section of the Association of American Railroads, this edition of the Cyclopedia has been completely rewritten and revised to give recognition to the many changes in practices and in materials in the ten years since the last edition appeared. It presents in concise and convenient form descriptions of materials, appliances, devices and work equipment, together with many standard plans and specifications, applicable to the construction and maintenance of tracks, bridges, buildings, water service and signal facilities.

The book is divided into seven sections, each written and compiled by a railway man with years of practical experience in his respective department. The six major divisions are subdivided into 95 chapters, such as Rail Renewal and Maintenance in the Track Section, Bridge and Structural Painting in the Bridge Section, Insulation in the Building Section, Water Treatment in the Water Service Section, Highway Crossing Protection in the Signal Section and Wood Preservation in the General Section. The editorial text presents a general discussion of the most efficient modern maintenance methods and is supplemented by many manufacturers' pages which present more detailed information concerning their specific products. These latter pages are arranged in close proximity to the editorial text for the convenience of railway officers in selecting and specifying materials and equipment.

In addition to the major divisions, the Cyclopedia includes a Definition Section, tersely defining 2,500 terms and expressions occurring in engineering and maintenance work and serving also as a general subject index. The contents include the latest specifications and standards of the A.R.E.A., the Signal Section of the A.A.R., the A.W.P.A. and other railway engineering societies.

The arrangement of the entire book including its Directory of Products, Trade Name Index and Alphabetical Index to Manufacturers' Pages has been devised to meet the exacting requirements of busy railway executives and the needs of their supervisory officers and staffs.



# WHAT'S the Answer?

## When Trucking Rails

*What precautions should be observed when trucking rails on push cars or trailers, to avoid injury to the men?*

### There Is Always Danger

By C. F. Larson
Superintendent of Safety, Missouri Pacific, St. Louis, Mo.

This is a subject that should receive the earnest attention of supervisors who have to do with work of this character. That there is always danger to the men engaged in trucking and handling rail is obvious to all maintenance of way officers and employees; and I hope to throw out some practical and constructive suggestions that will save them from injury. My first suggestion is not to truck rails any considerable distance if it is practicable to handle them by train or with a track dolly.

If they must be handled on a push car or trailer, make sure that the car is in good shape and that the bearings are oiled. Be sure that the car is spotted in such manner that the center of the rail can be placed over the center of the push car, chocking the wheels effectively to prevent the car from rolling in either direction. Never overload a push or a motor car. Before the rail is loaded, see that the deck of the car is free of loose material, such as bolts, nails, etc., that might cause the rail to shift or turn. If sufficient men are available, they should lift the rail by the ball, walk erect and place the rail on the car.

If the gang is an ordinary section gang, consisting of a foreman and three men, the rail should first be laid along the toe of the ballast; the three men should then pick up one end and walk to the center of the track, raising the end high enough to permit the foreman to get a lining bar under the rail on top of the push car. One man should then remain at the high end of the rail, the second should go to the low end and the third man should assist the foreman with the bar. The two men at the ends of the rail should then teeter the rail up level with the top of the car and work it over onto the bed of the car. For long rails, the use of two push cars or trailers is advisable, and these cars should be coupled with an approved coupler. The rails should be secured at each end of the push cars by means of chains or ropes where they are to be handled for any considerable distance.

Upon arriving at the unloading point, the car must be chocked effectively to prevent it from being moved in either direction. If sufficient men are available for unloading, they should work the rail out to the edge of the car, pick it up and carry it to its resting place. If they wish to deposit it on the ground, they should stop and a leader should call a signal to throw it away. If the gang is small, the unloading should be done by two men, one at each end of the rail. They should teeter the rail carefully, working it to the edge of the car, with the head up; then standing at the ends, roll it off the car. In all cases, men should be educated to handle rails from and not towards themselves.

Not more than three rails, more than 85 lb. in section, should be handled on a single push car. Extra precautions are necessary when passing around sharp curves and on grades. As a rule the speed should not exceed 6 to 8 miles an hour, and under no circumstances should it be greater than 15 miles an hour.

When more rails must be handled, two cars should be used. As a rule, not more than 10 rails heavier than 85 lb. to the yard should be loaded on a pair of push cars or trailers. No one should be allowed to ride on the rail cars, but the load should be watched at all times. It is important that the

**Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.**

### To Be Answered in March

1. *Should a supervisor go over his sections in detail with the foremen? Why? If so, how often? Should this be on foot or on motor car?*

2. *What causes paint to alligator? What measures can be taken to overcome the trouble?*

3. *When operating a motor car on a multiple-track line, should the car be stopped before meeting a train on the adjacent track? Why? Should the men dismount?*

4. *Is it practicable to repair built-up waterproofing on solid-floor bridges without suspending traffic? If not, why? If so, how should the work be done? How can the waterproofing be renewed?*

5. *What are the causes of failures in switch ties? What can be done to retard these failures?*

6. *Is there danger of underground pipe lines that have remained open during the winter freezing during spring thaws? Why? What can be done to overcome the trouble?*

7. *What are the relative merits of long and short guard rails opposite frogs?*

8. *Is it practical to preframe the lumber for small standard buildings? If not, why? If so, what are the limitations? What are the advantages?*

load be centered. The rails may be supported on blocks placed on each end of each car when necessary to prevent fouling of any part of the cars, and these blocks should be continuous under all rails. Rails should never be carried on a motor car.

These are cumulative suggestions from practical men of long experience in the handling of rails, who have been uniformly successful in preventing injuries to employees engaged in all kinds of maintenance of way work. Effective supervision is the keynote in carrying out these suggestions. Without it, failure will result.

### Balance the Rail

By J. R. Derrick
Assistant to General Manager, Norfolk & Western, Roanoke, Va.

When an emergency makes it necessary to truck rail and only one push car is available, extreme care should be exercised to insure that the rail is balanced properly on the car before it is moved. In all cases the push car or trailer should be coupled securely to the motor car to prevent the rail from running in on it in the event of a sudden stop. Wherever it is possible to secure two push cars for trucking rail, they should be used. When two such cars are employed, they should be connected with a coupler of suitable length and the lead car should be coupled to the motor car. Push cars used for this purpose should be equipped with bolsters and the rail should be placed as near the center of the car as practicable, to equalize the load on all of the wheels. Push cars in this service should never be overloaded and, when loaded, should be restricted to 8 or 10 miles an hour.

All persons should be forbidden to ride on a push car or trailer handling rail. The employees riding on the motor car should be seated, so that if there is a shift of the rail occasioned by a sudden stop, it will not run in on them. One employee should be designated to keep a lookout over the rail and advise the operator of the motor car immediately if any movement takes place in the rail. When unloading the rail from the push car, it should always be unloaded from the side and not from the end of the car.

# Flashing Built-Up Roofing

*What is the most satisfactory method of flashing built-up roofing? Does the pitch of the roof make any difference?*

### Make Joints Water Tight

By Frank H. Soothill
Chief Estimator, Building Department, Illinois Central, Chicago

It is essential that all joints in the roofs and walls of buildings be watertight. Sheet-metal protection, that is, flashing, is best for this purpose. Leaks in flashings may be caused by breaks in the material as a result of corrosion or mechanical failure, or by defective protection of the joints. Leaks occurring from this source defeat what might otherwise have been a water-tight roof.

While there are various methods of flashing built-up roofing, the cap-and-base flashing principle is generally conceded to give the best construction. In this method, the roofing plies are turned up against the wall at least 6 in., and base flashings are applied over the roofing and brought up along the wall. They are then lapped 4 in. by cap flashings set into the masonry. Base flashings are covered with two plies of the roofing felt feathered out to join the main roof covering.

On side walls, the cap flashing should be stepped from course to course as required by the slope of the roof and raggled into the masonry at least 2 in. For long runs of flashing at exposed points, it is often advisable to insert brass brackets, or straps about 1 in. by ⅛ in., in the masonry at intervals and extend them down over the flashing, to prevent the wind from lifting the cap flashings. The cap flashings may be tacked with spots of solder at the side laps.

The general acceptance of copper as the best metal for flashing is due to its many fine qualities, including light weight, ductility, ease of handling and its corrosion-resisting qualities. The sheets should be 16 oz. cold rolled.

Ordinarily, the pitch of the roof has little to do with the type of flashing. There are exceptions to most rules, however, and with roofs conditions may be encountered which require special treatment with respect to the flashing, such as the collection of ice and snow adjacent to the flashed walls. In these cases, particularly when the ice or snow melts, water may find its way through the wall and into the building, with damaging results. Where it is known that such conditions are likely to be met, the flashing should be let into the walls for its full thickness, stepping up on the vertical distance at brick joints as the flashing passes through the wall.

### Must Think of Repairs

By L. C. Winkelhaus
Assistant Engineer, Chicago & North Western, Chicago

When considering the application of flashing for a built-up roof, one must also think of repairs or replacements by ordinary maintenance gangs with materials that are readily available. With this in mind, probably the most satisfactory and economical method of flashing is as follows:

First, place a wooden cant strip where the sheathing and parapet wall meet; then carry two plies of roofing felt over the cant strip, mopping them to the wall. End the remaining plies a few inches back of the cant strip. Then apply two or three plies of the same material as the roofing over the foregoing construction, mopping them against the wall. Over this assembly apply a 55-lb. cap sheet. Fasten the cap sheet to the parapet wall by means of a 1-in. by 2-in. creosoted strip and nail it with 8 or 10-*d* nails, preferably iron cut nails. Then apply roofing cement of trowel consistency along the upper side of this latter strip to seal it to the wall, as well as to provide a water run-off. The pitch of the roof does not make any appreciable difference with the application.

### Copper is Preferred

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Built-up roofs depend on correct flashings for water-tightness. Fourteen-ounce, cold-rolled copper is preferred for reasonably lasting base, counter and cap flashing. Securely fastened copper base flashing should extend at least 4 in. onto the deck and up the parapet wall. Over this, two to four heavy bituminous sheets should be well mopped and extend at least 1 in. in both directions beyond the copper, and each ply should extend at least 1 in. beyond the ply it covers. The bituminous deck felts should be run over this flashing, extending at least 4 in. beyond the part of the flashing up the parapet wall. Every individual ply should be thoroughly mopped with the mopping material used for the roof itself.

Unless the felt flashing extends into flashing blocks, caps or counter flashings of copper are preferred to counter flashings that depend on bituminous cements or roofing compounds for lasting weather resistance. When the extra expense of a copper base, counter or cap flashing may not be justified, properly applied bituminous flashings may be satisfactory. Ordinarily, such flashings should not be laid in angles of more than 45 deg., thus necessitating cants in the corners. Cants should have a face of at least 4 in. and should be of wood for wood decks and of nailing composition for composition decks.

Bituminous flashings may be of two to four or more plies, well mopped and over-lapping to insure tightness. If raggle or flashing blocks are not provided for the sides, metal counter flashings should be used. Zinc may be substituted for copper as counter flashings over neutral saturated felts. If roofing felts are laid securely on built-up roofs, the pitch of the roof should make no difference so far as the flashing is concerned, as part of such flashing may be vertical.

# Keeping a Pile-Driving Record

*Should a permanent pile-driving record be kept for individual structures? Should this be detailed for each pile or for typical piles only? Why? Of what use is such a record?*

## Not a Blow by Blow Record

By C. C. Westfall
Engineer of Bridges, Illinois Central, Chicago

It is not necessary to keep a blow-by-blow record of piles as they are driven in trestles. Our foremen are provided with report blanks having spaces in which to show, for each pile, the length of the pile in the leads, the length of the cutoff and the penetration, as well as the type and weight of the hammer. There is also a column for "Remarks," in which unusual conditions encountered in driving are to be noted.

Before ordering piles for a job that is to be redriven, the records are examined to determine, if possible, the length of the piles in the existing structure. If this information is not obtainable and the bridge is of considerable length, test piles are driven. For shorter bridges, if the piles ordered are found to be of improper length, we are ordinarily able to supply the correct length from our stock. After the bridge has been driven, it is not as necessary to know the resistance to driving of the individual piles as it is to know the penetration and the distance from the tip of the pile below track level.

With this later information, one is in position to know when scouring around pile bents reaches a point to be disturbed about. When it becomes necessary to rebuild a bridge, the knowledge of the length of the pile driven previously and the behavior of the old bridge under traffic is, in general, sufficient to enable one to choose piles of the proper length. Detailed information as to the manner in which the piles drive is of relative value only, while the behavior of the bridge under traffic is positive.

I have never been inclined to require bridge foremen to spend unnecessary time keeping records on the work. A creosoted-pile trestle is an expensive structure and should be built as carefully as possible. To do this, the foreman has plenty to do in looking after the details of the work, without checking and recording the blows of the hammer.

## Record Should Be Kept

By H. Austill
Chief Engineer, Mobile & Ohio, St. Louis, Mo.

A record should be kept of all piles driven, except in falsework and temporary structures. In case of scour or change in the elevation of stream beds, it becomes highly important to know how much penetration the piles still have. The same question may also be of much importance when making plans for increased capacity for superstructures. When redriving piles in trestles, or when making bills of materials, it is always of value to know what the length and penetration of the piles were when the trestle was last driven.

I have known of many cases where plans were quite accurate as to the number of piles and their location in pier and abutment foundations, but revealed no information with respect to length and penetration. When the earth is washed away to the bottom of the masonry, or lower, and one knows only the number of piles under it, having no idea as to their length, but must decide whether it is safe to allow trains to pass over the structure, he is in a trying position, to say the least. Then, to start in to underpin such a structure after reaching the assumption that there must be 15 or more feet of penetration, only to find the end of a pile about 5 ft. below the masonry, is calculated to bring gray hairs in the head of the bridge engineer.

Our record forms include space to record the date of driving, the bent number and the pile number (every pile in the structure being given a number); the size of the pile, including the tip and butt diameters and the length; the distance from the base of rail to the ground line; the penetration; the length of the cutoff; and the character of the soil. This record is kept for every pile individually in the structure. A record should also be kept of the distance from the track to the stream bed, whenever there is possibility of scour.

In designing a building to be erected on an old foundation in which piles were used, the length of these piles is valuable information. One may explore the soil and learn the depths or thickness of the different strata, but unless the length of the piles has been recorded the presence of their tops gives little information as to the load they may carry safely.

## Makes Individual Record

By H. Tremaine
District Engineer, Northern Pacific, Spokane, Wash.

A permanent pile-driving record should be kept for individual structures and for the individual piles in each structure, whether the latter are permanent or temporary. This record should be complete, for in the average structure it will be the only check on the underlying materials. Many a quicksand stratum or other unfavorable formation has been discovered and analyzed through a pile record. Conversely, more favorable formations have been disclosed, which have permitted the modification of plans. The individual-pile record should be on file in the office of the chief engineer or the bridge engineer, and of the local officer whose duty it is to maintain the structure.

I have known instances where piles have been brought up hard on intermediate strata, which were later punctured through the continuance of the superimposed load. Here, the individual-pile record proved to be of value in the preparation of corrective

plans. At times it may be desirable to drive test piles for the record; these test piles may or may not be driven on the exact site of the structure, but to determine the character of the soil at the site or immediately adjacent thereto. A complete record should be kept of all test piles.

# What Causes Foul Ballast?

*What are the principal causes of foul ballast? What can be done in the way of prevention?*

## Five Principal Causes

By A. E. Perlman
Engineer Maintenance of Way, Denver & Rio Grande Western, Denver, Colo.

The principal causes of foul ballast are (1) spilled lading, (2) disintegration, (3) sand and dirt storms, (4) front-end cinders and (5) washins. The prevention of foul ballast by spilled lading can best be accomplished by making certain that open-top cars are not overloaded, that dump bottoms are closed properly and that all cars are in good condition.

Disintegration of the ballast can be prevented in large measure by the use of proper types of ballast where is is economically possible to do so. The fouling of ballast by sand and dirt storms can be overcome by the use of sand fences, built and installed on the same principle as snow fences.

Deposits of front-end cinders present a serious problem on heavy grades, carrying a high density of traffic. They must be removed from the ballast by cleaning. Some roads are now experimenting with a vacuum cleaner in an effort to reduce the cost of operation. On roads situated in mountainous or other hilly country, where quick runoff causes deposits of debris on the track, no adequate solution has yet been found, since bridges and culverts become plugged with the debris after cloudbursts, and the material deposited on the track fouls a considerable amount of the ballast. Conditions can be alleviated somewhat by a study of the drainage areas involved, to take care of normal precipitation.

## Names Three Causes

By H. R. Clarke
Engineer Maintenance of Way, Chicago, Burlington & Quincy, Chicago

The three principal causes of foul ballast are (1) soft material in the roadbed working up into the ballast; (2) deterioration of the ballast itself; and (3) foul material from the outside working into the ballast. Suggesting what might be done in the way of prevention is somewhat more difficult than naming the causes.

The fouling of ballast by material that works up into it from the roadbed generally occurs on new construction and as the amount of this class of work has been quite limited for several years, this does not seem to be a serious matter at present. Prevention of the fouling of ballast from this cause can best be accomplished by using suitable material for the construction of the roadbed and rolling it, or by compacting it in some other way, as the grade is being built up. Then, for the sub-ballast or the first lift, one should use a material that will form a mat or cushion, which will not settle into the roadbed seriously, and which will be of sufficient fineness to offer material resistance to the working up of material from below. The complete ballast section should be of sufficient depth to spread the traffic load properly and so prevent the undue forcing of the ballast into the subgrade. When there is a suspicion that the roadbed may be soft by reason of water being present, a system of subdrainage should be installed to insure stability of the subgrade.

Prevention of foul ballast developing by reason of deterioration of the ballast itself, can be prevented only by using suitable material for the ballast. This is not always possible, but it should be given careful study when the ballast supply is being decided on.

Probably the most serious cause of foul ballast is the presence of foreign or outside material working in from the surface. This comes from material falling from cars moving over the track; from sand, dust and dirt blowing in from the right of way and adjacent fields; and fine cinders from the locomotives. There is little that can be done to prevent fouling from this cause. Where the right of way is sandy or is subject to wind erosion, every effort should be made to secure a growth of weeds or grass, but even when this is done on the right of way, material frequently blows in from beyond the right of way, and this is beyond our control.

The maintenance of equipment in good condition to prevent the leaking of contents will reduce the amount of material falling on the track from passing traffic. This attention is justified, not only from the standpoint of track maintenance, but equally or even more from the standpoint of avoiding loss and damage claims.

# Caring for Motor Cars

*What measures are desirable to insure that foremen take proper care of their motor cars? Who should be responsible for seeing that this is done?*

## Keep Close Watch

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

I know of no better way to assure that motor cars are being cared for properly than to follow the matter continually by close inspection to determine whether rules and special instructions are being complied with. Some foremen take more interest in their motor cars than others and greatly appreciate the value of the equipment in their charge; others pay little or no attention to the equipment so long as the machine continues to operate. Motor cars should be given a close inspection daily; they should be kept clean of oil and grease, and free from useless or worthless material, such as is often carried on motor cars. All bolts should be kept tight and all bearings should be kept lubricated.

A foreman least concerned with the condition or value of his motor car can often be educated to take care of the equipment properly by close and accurate instructions. This responsibility falls on the shoulders of the supervisor and roadmaster, who should inspect motor cars and issue instruc-

tions to their foremen or others in charge of the equipment in such a way that they will rise to their responsibility for keeping motor and push cars in good and neat condition at all times. Such instructions should cover the safety appliances and fire hazards, as well as the general upkeep of the equipment.

### One Man Only

By C. L. Fero
Supervisor of Work Equipment, Boston & Maine, Boston, Mass.

It is essential that one man, and only one, be assigned by the foreman to operate and care for the motor car. He should be of at least average intelligence, mechanically minded and thoroughly reliable. The foreman should arrange, through his supervisor, to have the motor-car maintainer instruct this man in the care and operation of the car, and should see that he is allowed time adequately to do such servicing as the maintainer indicates is necessary. Work prescribed by the maintainer should be checked by the foreman, who should be held strictly accountable by the supervisor or roadmaster. However, adjustments of timers, coils, magnetos, carburetors and other items requiring a more comprehensive knowledge of the motor than is to be expected of the operator, should be handled by the district motor-car maintainer.

If the work of the gang requires the transportation of heavy materials by motor car, over a section that has gradients of varying degree; if the distribution of heavy or light materials requires the stopping and starting on grades; if heavy equipment must be hauled by a gang supplied with only a light section car; or if the trailers or push cars in hauling service are of insufficient capacity or are in poor condition, the supervisor is the one to correct the situation and thus stop the improper use or abuse of the motor car. His constant contact with his gangs will enable him to observe whether scrap is being carried about without unloading; whether unnecessary tools are being carried; whether trailers are being pulled about needlessly; and the general condition and performance of the respective cars.

He can best enforce his own rules and those transmitted from his superior officers as to the care and maintenance of the motor cars on his district. His broader and more comprehensive viewpoint fit him to arbitrate differences between the maintainers and the men actually operating the cars. The importance of co-operation between these interests cannot be emphasized too strongly. Any difficulties which cannot be settled in the field should be referred to the system supervisor of work equipment for final decision and such action as may be necessary to stop the controversy.

## Who Should Repair Wooden Tanks?

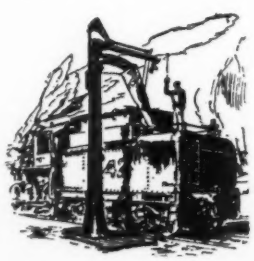
*Should repairs to wooden tanks be made by water-service gangs or by carpenter gangs? Why?*

### Favors Carpenter Gangs

By J. P. Hanley
Water Service Inspector, Illinois Central, Chicago

My experience as a division water-service foreman and later observation in other positions, indicate that it is better to have repairs to wooden tanks made by carpenter gangs, assisted by water-service men when necessary, than to develop a water service gang to handle this class of work. Usually, the repair or replacement of parts of tank frames requires the use of heavy jacks and other tools that a bridge gang carries as part of its regular equipment. The raising and shoring of a water tank, made heavier by its contents, is similar to heavy bridge work with which the bridge gang is thoroughly familiar, but with which the average water-service repair man has had little or no experience.

I believe, however, that the division water-service foreman should be present and assist when heavy repairs are being made to a tank, to see that the water level is reduced to and maintained at the minimum safe level; that the dispatcher is informed promptly of any temporary water shortage that may be necessary; and that incidental pipe work or special items of work are cared for promptly. When rehooping a tank, the carpenter gang can erect the scaffold to best advantage, but the water-service repairman should be on hand to assist, for he has pipe wrenches, molt dies and other needed tools that the carpenter gangs seldom possess. These comments are based on the divisional organization with which I am familiar. In this type or organization, the co-operation between the water-service and carpenter gangs has proved to be satisfactory and economical.



### Use Carpenter Gangs

By W. C. Harman
Bridge and Building Supervisor, Southern Pacific, San Francisco, Cal.

Water service, bridge and building work are so sharply divided as to requirements that they should be segregated along these major lines. Yet it is not impracticable for bridge and building gangs to handle all three classes of work, as is being done on some divisions. However, where there are two organized departments the various classes of work should be allocated to the departments or gangs that are best fitted to handle them most effectively. Each class of work requires special tools and equipment and the men assigned to it are experienced and specially trained for the work in their own department. Under the present set up of the division of labor, the bridge and building department does not employ pipe fitters and plumbers; and the water department does not have carpenters or painters on its roster.

Repairs to wooden tanks which should be assigned to water-service gangs include pipe work, valve and spout replacements, valve leathers and adjustments to gages, floats and other mechanisms. This work requires few heavy tools, little staging and only two to three men at the most, but they must have special tools. On the other hand, carpenter gangs should repair and replace posts, sills, hoops, roofs and the tub, and should do such painting as becomes necessary. This work requires lumber for staging, carpenter tools, painting equipment and portable air compressors, none of which is carried by the water-service men.

Carpenters living in outfit cars are seldom stationed at key points or telegraph offices and are not quickly available for emergency repairs. They should not, therefore, be assigned to valve work, pipe fitting or other items

that so often require emergency action. On our road, water-service repairmen are stationed at important points with the idea of getting quick action and thus avoiding delay to trains. They are provided with automobiles or motor cars and are on call at all times to make minor repairs, while a larger and not quite so mobile a gang looks after the heavy pipe work and construction requirements of the department. I believe it to be impracticable for a mechanic to handle both classes of work on a busy line, for which reason I would make the division as outlined.

### Become Jack of all Trades

By E. M. Grime
Engineer of Water Service, Northern Pacific, St. Paul, Minn.

A water-service gang usually consists of a foreman and one or two helpers who are essentially mechanics familiar with all kinds of pipe work. They soon become jacks of all trades, and can make such minor repairs to tanks as adjusting targets, repairing spouts, repairing or replacing manhole covers, replacing defective door hinges and locks, tightening loose hoops, etc., at minimum expense.

On the other hand, a wooden tank is strictly a carpenter's job and there is no question but that extensive repairs should be handled by a carpenter gang. Such a gang should have in its outfit the lumber necessary for scaffolding as well as other items that will be required for such an important undertaking. As a matter of course, while this gang is making the carpenter repairs, it will also do other work, such as adjusting hoops, replacing or repairing the tank spout, providing new ladders, etc., so that the expense of sending a water-service gang in the immediate future to look after some minor detail will be avoided.

A large part of the cost of railway maintenance results because the work is scattered over so wide a territory that much time is lost in going from one point to another. For efficiency, therefore, it is necessary to have maximum co-operation between all departments and gangs and not be too particular as to the segregation between carpenter, metal and other trades involved in the work.

# Track Levels and Gages

*What measures should be taken to insure the accuracy of track gages and levels? Who should be responsible for insuring accuracy?*

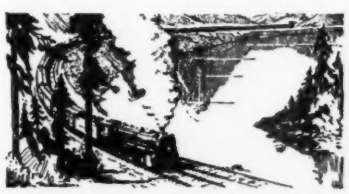
### Accuracy Vital

By W. L. Roller
Division Engineer, Chesapeake & Ohio, Columbus, Ohio

With the narrow margin of tolerance allowed in track and turnouts to accomodate the wheel gages of cars and engines, the accuracy of track and flangeway gages becomes a matter of vital importance. This is particularly true with respect to the maintenance of gage through turnouts where the guard-face gage through the frog and guard rail are involved, as well as the track gage. The guard-face gage at the frog, where a flangeway 1¾ in. wide is used, allows no tolerance for the back-to-back gage of some classes of car wheels and locomotive driving wheels. This has been overcome, however, by the adoption of 1⅞-in. flangeways.

Among the measures that should be taken to insure the accuracy of track gages are (1) frequent and periodic inspection of all gages in active use. This should be made by the supervisor, who should have a master gage for this purpose. He should be informed as to the limits of permissible wear, and the over and under tolerance, beyond which the gage is to be condemned. An inspection (2) should be made of all repaired gages coming from the repair shops, to insure that none of improper length are returned to the foremen.

In the repairs to pipe-connected gages and in placing insulation in them, the maintenance of exact length is sometimes overlooked or disregarded and unless they are inspected carefully, inaccurate gages may be sent out to the track forces. Instances have occured where repaired gages of this type have checked ¼ in. short of standard. A track gage is a precise instrument; when new it is invariably of sufficient accuracy for its intended purpose, but gradually loses this accuracy through wear or through subsequent changes or repairs. For this reason, the responsibility for continued accuracy must be placed on men who use the gage or repair it.



The need for accuracy in track levels is not so obvious as for gages; yet, since good cross level is a first requisite in the maintenance of good-riding track, especially where high speeds are maintained, the requirements for accuracy should be severe. Poor or improper leveling not only leads to an increase in the difference in the elevation in the two rails by reason of additional load on the low rail, but it also causes nosing and lurching of the equipment and leads to other track defects. In view of these results, it is apparent that track levels should be checked for accuracy and that they should be equipped with bubbles that are sufficiently sensitive to permit detection of the least disparity in the elevation of the two rails. Recent studies of track levels in common use reveal that the majority of them have bubbles that are so sluggish as to render it almost impossible to insure equal elevation of both rails in the routine surfacing of the track.

The responsibility for checking the accuracy of track levels should also rest with the supervisor. He should make frequent and periodic inspection of all track levels in use, comparing them with his standard level and arrange for the readjustment or elimination from service of all of those found to be unfit for use.

### Good Tool Required First

By J. B. Kelly
General Roadmaster, Minneapolis, St. Paul & Sault Ste. Marie, Stevens Point, Wis.

In the first place, if the accuracy of levels or gages is to be assured, good tools are necessary. The stores department should be held responsible for knowing that these tools are correct and accurate when they are issued. To do this, a substantial testing stand is necessary, including gage and level contact points. The level point must be adjusted so that the level board will check exactly level when in two positions and when reversed. The device for testing the superelevation offsets should be a varied-elevation rack that is known to be equally accurate.

Level boards should be light in weight and equipped with an adjustable level glass. As an aid to the maintenance of accuracy in track

gages and for getting the best gaging results, provision should be made to overcome the bead of overflowing metal on the head of the rail by recessing the forked end of the gage above the 5/8 in. gaging point on the rail.

If these tools are accurate when issued, it becomes the responsibility of the foreman to check them and keep them in condition, within his ability. When either of them becomes out of adjustment, he should make an immediate request for replacement. A further periodical check by the supervisory officer is necessary to insure that the foremen have an understanding of what constitutes accuracy.

# Painting Old Brick Buildings

*What methods can be employed to obtain an attractive appearance when painting the exterior of an old brick building?*

## Has Used Steam Cleaning

By G. A. Rodman
General Supervisor of Bridges and Buildings, New York, New Haven & Hartford, New Haven, Conn.

I prefer to clean brick buildings with a steam jet and cleaning compound. We have cleaned some tough looking buildings in this way, with satisfactory results. If it is desired to paint the brick surfaces, first rake out the joints and repoint them; then wash the wall to remove all dirt and grease. If the brick is very porous, apply a coat of sizing, then a priming coat and follow this with the finishing coat, using a color as nearly as possible like that of the brick. Doors, windows and trim should be painted to harmonize with the walls.

## May Protect Surface

By E. C. Neville
Bridge and Building Master, Canadian National, Toronto, Ont.

Buildings of hard-pressed brick seldom need to be repainted, except where it is desired to change the appearance to make them blend in with the decorative scheme of adjoining buildings. When built of softer brick, painting may be required, not only to improve the appearance but to protect the brick against disintegration and crumbling, especially if the building is very old. Bricks are porous and absorb moisture readily. In the colder sections, frost usually lends a hand in spoiling their appearance.

Paint protects the surface of the brick in the same way that it protects other surfaces, but it must be applied on a thoroughly dry and properly prepared surface if the best results are to be obtained. The brick should be gone over with a stiff fibre brush to remove all loose material and excess moisture. When there is any evidence of moisture in the walls, a search should be made to discover its source and have it removed before the paint is applied.

Good workmanship, as well as good material, is essential to a first-class job, and as the labor constitutes about 75 per cent of the total cost it is evident that an attempt to reduce the cost by using cheap or inferior paint will be false economy. To insure an attractive appearance when painting an old brick building, several items must be given consideration, such as the architectural design, the type of buildings immediately adjacent and the general surroundings.

A low one-story building having a heavy overhanging roof will require treatment differing from a tall building with narrow cornices and plain walls with few door and window openings. Certain types of buildings, such as stations, can be made quite attractive if painted all in one color without contrasting trim. Other types may require very distinct contrasting colors or shades for the trim to maintain the architectural appearance. Out in the open where the atmosphere is not laden with smoke, lighter colors can be used to good advantage and will retain their appearance for a considerable time.

A light-gray body color trimmed with a darker shade of gray, or a soft shade of green makes a good combination and presents an attractive appearance. Moreover, it stands up well, retaining a fresh appearance as long as it is not subjected to smoke and dirt. If the building is exposed to smoke and dirt, it is better to use a darker body color, with a light trim or a solid overall color without trim, either of which will give the building a pleasing and attractive appearance.

## A Necessary Evil

By O. G. Wilbur
Field Engineer, Baltimore & Ohio, Baltimore, Md.

It is a fact that many of the older brick buildings owned by the railways have been painted, some of them because of the general condition of the masonry, in an attempt to check dampness in the walls and to prevent deterioration of the brick. It is accepted that painting under the circumstances may be justified, but I consider that such an operation should be classed as a necessary evil.

It can scarcely be accepted that the painting of a brick building to improve its appearance is the proper thing to do. No doubt the paint job will change the appearance but it is my observation that no paint treatment can be given a good brick wall, which will result in an attractive appearance, for it takes away from the structure more than it gives it in the way of a temporary brightening up. It seems pertinent to inquire why one should cover up with paint, the interest, the warmth and the life that are to be found in a substantial brick masonry wall. Once the wall is painted, it must be included periodically in the maintenance program for repainting. If, instead of painting it the first time, the walls were cleaned and pointed, the attractiveness of the masonry could probably be restored and this form of improvement in appearance will long outlast the paint job.

From the standpoint of economics, cleaning and pointing will cost about the same as painting; the cleaning will be required less often to maintain the appearance. For old brick buildings, the walls of which are good masonry, that have been painted and the attractive appearance of which is a factor, instead of continuing with the periodic application of paint, I suggest the removal of the paint that has been an eyesore and thus restore the natural appearance of the walls as they were erected originally.

Undoubtedly the removal of the paint will be more costly than the application of more paint, but even from a maintenance standpoint it will probably be economical, since less future effort will be required to maintain its appearance. Buildings in shop yards that have been painted, should be repainted with a color that is slowest to reflect dirt, if the cost of removal of the old paint is definitely beyond a justifiable expenditure.

# NEWS of the Month

### Pere Marquette to Build Two-Million-Dollar Car Ferry

The Pere Marquette has awarded a contract of approximately $1,970,000 to the Manitowoc Shipbuilding Company for the construction of a steel car ferry, believed to be the largest and most powerful ever designed for operation on the Great Lakes.

### Canadians Establish Priority Control of Shipping

The Dominion government at Ottawa has appointed T. C. Lockwood of Montreal, Que., as "Canadian Controller" of a scheme, which will be made compulsory at an early date, for the co-ordination of all transport activities on land and water for the wartime movement of commodities.

### $42,000,000 for Crossing Elimination in New York

The New York Public Service Commission has announced a list of 37 grade crossing eliminations for New York State, which are to be considered during 1940. The total estimated cost of the projects is $42,380,200. The largest projects in this program include $12,500,000 for work in Niagara Falls; $7,000,000 in Saratoga Springs, and $5,000,000 in Corning.

### South Wins Freight Rate Case

In a five-to-four decision on November 22, which was made public on November 30, the Interstate Commerce Commission awarded the South a victory in principle in a case involving reduction of Southern inter-territorial freight rates, which was widely promoted by a group of Southern governors. The decision of the Commission ordered northbound inter-territorial freight rate adjustments on certain commodities which it found "will not move freely at rates higher, distance considered, than those applicable within the north." On the other hand, no relief was granted in connection with the assailed rates on more than half of the 17 commodity groups named in the complaint.

### I.C.C. Reverses Old Policy Sanctions Trainload Rate

In an eight-to-two decision, the Interstate Commerce Commission reversed a life-long policy and sanctioned the principle of a rate based on an 1,800-ton minimum shipment. The particular case applied to the shipment of blackstrap molasses, when shipped in 1,800-ton lots from New Orleans, La., and Harvey to Peoria, Ill., and Pekin. In its decision, however, the Commission ordered a rate of 15 cents per 100 lb., instead of the proposed rate of 14 cents. The majority opinion stated that the proposed rate "is not a trainload rate—it is rather a quantity or multiple car rate." Commissioner Porter dissented, contending that "the trainload rate here adopted—is but another step in the furtherance of discriminatory tendencies" in rate-making.

### Unfavorable Report on Proposed Waterway

An unfavorable report on the proposed improvement of the Great Lakes-Hudson River Waterway from Three River Point, N.Y., to the Niagara river has been submitted to the Board of Engineers for Rivers and Harbors in the War Department by the division engineer at Cleveland, Ohio, upon the grounds that the annual costs of the improvement would exceed the estimated benefits; that existing facilities amply care for the needs of present and immediately prospective commerce; and that the easterly portion of the Barge Canal on the through waterway between the Atlantic Ocean and the Great Lakes, via Oswego, N.Y., and the Welland river, is now being improved with government funds.

### Truckers Contracts To Be Made Public

Contracts showing actual as well as minimum charges and other information concerning the operation of contract truckers subject to the Motor Carrier Act, will be open to public inspection after April 1, 1940, according to a six-to-five decision of the Interstate Commerce Commission. In the decision the majority report stated, "A basic principle of carrier regulation is that full publicity of a carrier's charges is necessary and desirable in the public interest. There can be no effective regulation of common carriers until their charges are made public. Otherwise, it would be impossible to prevent rebating, discrimination or preferences among shippers who patronize them."

### Illinois Central Passenger Trains Collide

At 6 a.m. on January 1, the northbound Panama Limited of the Illinois Central ran into the rear end of the Louisiane at Arcola, Ill., killing one passenger and injuring several persons, of whom nine passengers and four employees required hospitalization. In the territory where the accident occurred, trains are operated right hand on double track with continuous automatic train control with cab signals. The train control and cab signal apparatus on the Panama Limited had failed north of Centralia and the dispatcher had authorized the train to proceed and had advised the engineman and conductor of the Louisiane that the Panama Limited was following "without train control." The Louisiane had made a flag stop at Arcola and had gotten under way, attaining a speed of 15 m.p.h. when it was stuck by the Panama Limited, which was traveling at 45 m.p.h. when the Louisiane was sighted.

### Decrease in Grade Crossing Fatalities

According to the Safety Section of the Association of American Railroads on November 24, fewer persons lost their lives as a result of highway-railroad grade crossing accidents in August this year, than in any month since August, 1932. Fatalities in August totaled 78, a decrease of 21 compared with August last year and a decrease of 16 compared with July, 1939. In August, 1932, there were 77 fatalities. Persons injured in crossing accidents in August this year totaled 279, an increase of 59 compared with August last year. The total number of such accidents in August, 1939, was 209, a reduction of 6, compared with the same month a year ago.

### Death Tolls Mount In German Wrecks

A death toll of 231 in two accidents in one week during the latter part of December climaxed a series of wrecks on the German State Railways, which many observers believe reflects a critical condition in personnel and equipment. The first of the two recent and most serious accidents occurred on December 22 at Genthin, when a Berlin-Neunkirchen express crashed into a Berlin-Cologne express, killing 132 and injuring 109. It was reported that the Neunkirchen train failed to obey a stop indication of an automatic block signal. The other wreck, which occurred late the same day between Friedrichshafen and Rudolfzell, involved a local passenger and a freight train.

# Personal Mention

## General

**C. P. LeSueur,** supervisor of track at the Macon (Ga.) terminals of the Central of Georgia, has been promoted to trainmaster, with headquarters at Savannah, Ga.

**V. R. Walling,** engineer of maintenance of way of the Chicago & Western Indiana and of the Belt Railway Company of Chicago, has been appointed superintendent of the Chicago & Western Indiana, with headquarters, as before, at Chicago.

**Frederick B. Hank,** assistant engineer in the office of the executive vice-president of the New York Central at New York, has been appointed assistant to vice-president and general manager, with the same headquarters. Mr. Hank was born at Troy, N.Y., on January 5, 1893, and graduated in civil engineering from Rensselaer Polytechnic Institute in 1915.

Frederick B. Hank

He entered railway service in November, 1915, as a rodman in the engineering department of the New York Central. In 1920 he was appointed assistant engineer in the designing engineer's office at New York, and became assistant designing engineer, lines Buffalo and East, with headquarters at New York, in 1925. Mr. Hank was appointed assistant engineer in the office of the executive vice-president at New York in 1930, the position he held until his recent appointment as assistant to the vice-president and general manager.

**E. P. Adams,** supervisor of track on the Wilkes-Barre division of the Pennsylvania, with headquarters at Reading, Pa., has been promoted to assistant trainmaster on the Indianapolis division, with headquarters at Louisville, Ky. A biographical sketch of Mr. Adam's career was published in June issue of *Railway Engineering and Maintenance*, following his promotion to supervisor of track on April 1, 1939.

**W. R. Devenish,** general superintendent of transportation of the Western region of the Canadian National, with headquarters at Winnipeg, Man., and an engineer by training and experience, has been appointed general manager of the region and **Sherman Smith,** assistant superintendent of the Edmonton division at

W. R. Devenish

Edmonton, Alta., also an engineer by training and experience, has been appointed superintendent of the Calgary division.

Mr. Devenish was born in Ireland on November 21, 1882, and was educated at St. Columbus College and Trinity College, Dublin. After previous experience as an engineer in railway work, he engaged in construction activities with the Transcontinental Railway in 1912 and the following year became division engineer for the Intercolonial at Moncton, N. B. After holding supervisory posts at Campbellton, N. B., and Moncton, he was appointed general superintendent for the Canadian National at Toronto and later at North Bay, Ont. In 1928 Mr. Devenish became general superintendent of the Alberta district, with headquarters at Edmonton, Alta., and in 1936 he was appointed general superintendent of transportation for the Western region, with headquarters at Winnipeg, which position he held until his present promotion.

Mr. Smith was born on August 26, 1879, at Omaha, Nebr., and graduated from Dartmouth College in 1903. He entered railway service in May, 1904, as an in-

Sherman Smith

strumentman on the Chicago & North Western, and from July, 1904, to August, 1905, was employed in the chief engineer's office of the Union Pacific at Omaha, Nebr. For the next two years he served as office engineer at Denver, Colo., and then resigned to become resident engineer on the Canadian National at Rivers, Man. He held this position until July, 1908, when he was promoted to assistant engineer at Melville, Sask. In September, 1918, he was promoted to assistant superintendent at Edson, Alta., and was transferred to Calgary in August, 1928, and to Edmonton in September, 1937.

**Albert Shaw,** vice-president and general manager of the Lehigh & Hudson River, with headquarters at Warwick, N.Y., and an engineer by training and experience, has been elected president. Mr. Shaw was born at Williamsport, Pa., on June 12, 1884, and entered railway service with the New York Central on March 20, 1904, serving as a rodman at Corning, N.Y. He left the New York Central for a similar position on the Reading in March, 1905, and the following year was appointed assistant supervisor at Tamaqua, Pa. He was later appointed assistant supervisor of the New York division and also served in the same capacity at Lansdale, Pa. Mr. Shaw was promoted to supervisor in Jan-

Albert Shaw

uary, 1912, and in July, 1920, became assistant trainsmaster, being appointed joint assistant trainmaster at Newberry Junction, Pa., a short time later. In May, 1926, Mr. Shaw left the service of the Reading to become superintendent of the Lehigh & Hudson River, becoming general superintendent in December, 1928, the position he held until his appointment as vice-president and general manager on January 1, 1939.

**George H. Dugan,** an engineer by training and experience, who has been a member of the National Railroad Adjustment Board, has returned to the service of the Southern and has been appointed assistant to the vice-president, with headquarters at Washington, D.C. Mr. Dugan was born on January 22, 1884, in St. Charles County, Mo. He entered the service of the Terminal Railroad Assocition of St. Louis as a messenger in December, 1900, and was promoted to yard clerk in June, 1901. From August, 1903, to December, 1904, he was with the St. Louis World's Fair and in January, 1905, entered the service of the Southern at Atlanta, Ga., as a transitman in the maintenance of way department. He was transferred to the

construction department as assistant engineer in September, 1906, and was appointed engineer maintenance of way, subsidiary lines of the Southern in May, 1920. In November, 1924, Mr. Dugan be-

George H. Dugan

came vice-president, subsidiary lines, in charge of all departments, in which position he continued until August 1, 1934, when he was appointed, by the railroads, a member of the National Railroad Adjustment Board at Chicago, from which position he was recalled to the Southern.

## Engineering

**Edward Alfred Harrison,** architect of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, has retired, effective January 1.

**A. B. Hillman,** roadmaster of the Belt Railway Company of Chicago, with headquarters at Clearing Yard, Ill., has been promoted to engineer of maintenance of way of the Chicago & Western Indiana and the Belt Railway, with headquarters at Chicago, succeeding **V. R. Walling,** whose appointment as superintendent of the C. & W. I., is announced elsewhere in these columns.

**Henry A. Horning,** superintendent of buildings of the Michigan Central, with headquarters at Jackson, Mich., has retired, effective January 1, and **J. E. Bebb,** bridge engineer has been appointed assistant engineer of structures, with jurisdiction over both bridges and buildings and with headquarters as before at Detroit. **A. B. Nies,** assistant engineer of buildings has been appointed assistant engineer in the office of the engineer of structures, with headquarters at Detroit.

**T. P. Polson,** division engineer on the New York, New Haven & Hartford, with headquarters at Providence, R.I., has been promoted to the newly-created position of engineer of track, with headquarters at New Haven, Conn. **G. P. Elliott,** office assistant to the engineer maintenance of way, with headquarters at New Haven, has been promoted to division engineer, with headquarters at Boston, Mass., to succeed **J. B. Bell,** who has been transferred to Providence, to replace Mr. Polson. **C. D. Prentice,** assistant division engineer at New Haven, has been promoted to office assistant to the engineer maintenance of way, with the same headquarters, to succeed Mr. Elliott, and **S. J. Polson,** assistant division engineer at Providence, has been transferred to New Haven to succeed Mr. Prentice. **H. K. Hislop** has been appointed assistant division engineer at Providence to replace S. J. Polson.

Mr. Bell was born on February 9, 1896, at Providence, R. I., and attended the Technical high school at Providence and the Rhode Island School of Design at the same point. He entered railway service on February 4, 1913, as a rodman on the New Haven, being appointed an inspector in March, 1916. Three months later, Mr. Bell left the company on a leave of absence to serve with the National Guard on the Mexican border, returning to the position of inspector on the New Haven in November, 1916. In December of the same year, he became a draftsman in the office of the engineer maintenance of way at New Haven, later serving as an assistant engineer at the same point. In June, 1917, Mr. Bell again left the railroad to serve in France with the United States Army during the World War. Returning from the service in July, 1919, he became a transitman on the New Haven, later serving successively as cost engineer and as an assistant engineer. In October, 1926, he was appointed assistant track supervisor at Waterbury, Conn., holding this position until November, 1928, when he was advanced to supervisor of track with headquarters at Putnam, Conn. In June, 1930, Mr. Bell was promoted to division engineer at Boston, where he remained until September of the same year when, owing to the abolition of the Old Colony and Watertown divisions, he was appointed assistant division engineer at Providence. In March, 1933, he became an assistant engineer at Providence, being promoted to assistant division engineer at the same point in December, 1934, and then transferred to Boston in July, 1936. On March 1, 1937, Mr. Bell was appointed office assistant to the engineer maintenance of way, with headquarters at New Haven, being promoted to division engineer at Boston on September 1, 1939. His transfer to Providence became effective on December 1.

**R. E. Oberdorf,** assistant engineer on the New York, Chicago & St. Louis (Nickel Plate) at Fort Wayne, Ind., has been promoted to assistant district engineer of the Lake Erie & Western District, with headquarters at Frankfort, Ind., succeeding **H. F. Whitmore,** whose promotion to division engineer, with headquarters at Frankfort, was announced in the November issue. **R. A. Gleason,** draftsman at Cleveland, Ohio, has been appointed assistant engineer at Fort Wayne, replacing Mr. Oberdorf.

**Harold L. Barr,** whose promotion to division engineer on the Chicago & North Western, with headquarters at Chadron, Neb., was announced in the November issue, was born at Florida, Ohio, on December 28, 1897, and attended Defiance College, Defiance, Ohio, for two years. He entered railway service in June, 1916, as a signal helper on the Baltimore & Ohio, and later served successively as a laborer, material clerk and assistant supervisor of track. In March, 1919, Mr. Barr left the B. & O. to return to college and in August, 1919, he re-entered railway service as a tapeman in the engineering department of the North Western, later being promoted successively to rodman, instrumentman and assistant engineer at Casper, Wyo. In August, 1925, he was promoted to roadmaster at Lusk, Wyo., and in January, 1928, he was transferred to Boone, Iowa. In January, 1936, Mr. Barr was re-appointed assistant engineer, with headquarters at Huron, S.D., the position he held until his recent promotion.

**Earl L. Mayne,** whose promotion to office engineer in the office of the chief engineer of the Western lines of the Atchison, Topeka & Santa Fe at Amarillo, Tex., was announced in the December issue, was born at Darlington, Wis., on September 7, 1890, and graduated in civil engineering from the University of Colorado in 1914. He entered railway service on July 27, 1914, as a chainman in the division engineer's office on the Santa Fe at La Junta, Colo., and subsequently served as a chainman and rodman at San Marcial, N. M., Las Vegas, N. M., and Pueblo, Colo. On August 1, 1915, he was promoted to transitman in charge of the inventory party engaged in I. C. C. valuation work. In October, 1916, he was transferred to the Plains division at Amarillo, and during the World War he served overseas with the A. E. F. He returned to the Santa Fe in June, 1919, as a transitman at Amarillo, a short time later being promoted to assistant engineer in charge of the design of reinforced concrete struc-

Earl L. Mayne

tures in the office of the chief engineer of the Western lines. In September, 1927, he was advanced to assistant office engineer, the position he held until his recent promotion.

**Harry E. Jones,** assistant engineer of maintenance of way of the Lehigh & New England, with headquarters at Bethlehem, Pa., has been promoted to engineer of maintenance of way, with the same headquarters, succeeding **W. O. Dennis,** whose death on November 16, was announced in the December issue. Mr. Jones was born in Terryville, Conn., on May 22, 1890, and graduated in civil engineering from Lafayette College, Easton, Pa., in 1915. Immediately following graduation he be-

came a transitman for the city of Lebanon, Pa., and in April, 1916, he entered railway service as a transitman on the Central Railroad of New Jersey at Allentown, Pa. Three months later he went

Harry E. Jones

with the Lehigh Valley as a transitman at Buffalo, N.Y., and during the World War, he served in the signal corps of the A.E.F. After the war Mr. Jones served for a time as a draftsman for the Weirton Steel Company at Weirton, W. Va., and later as a draftsman for the Babcock & Wilcox Company, at New Village, N.J. He re-entered railway service on October 1, 1920, as a transitman on the Lehigh & New England and on March 1, 1926, he was promoted to track supervisor. Mr. Jones was advanced to assistant engineer maintenance of way, with headquarters at Bethlehem, on April 1, 1936, the position he held until his recent promotion, which was effective January 1.

**C. F. Womeldorf,** whose retirement on November 1 as division engineer on the Chicago & North Western, with headquarters at Norfolk, Neb., was announced in the November issue of *Railway Engineering and Maintenance*, graduated in civil engineering from Washington University, St. Louis, Mo. Following graduation he served for a time as assistant engineer for the water department of the City of St. Louis and later became assistant engineer on the construction of a line in New Mexico for the El Paso & North Eastern (now part of the Southern Pacific). Upon the completion of this work, he became assistant engineer on the location and construction of the Denver, North Western & Pacific (now the Denver & Salt Lake). He later became successively manager of the review department and a member of the board of managers of the Griffin Wheel Company, Chicago, resident engineer with the Wisconsin Bridge Company in charge of the construction of a bridge across the Mississippi river at Burlington, Iowa, and during the World War, superintendent of construction for the U. S. Government of the Denver General Hospital at Denver, Colo., and assistant engineer, North West Region, U. S. Railway Administration, with headquarters at Chicago. Following the period of government control of the railroads, Mr. Womeldorf went with the Chicago & North Western and in 1920, he was appointed division engineer at Norfolk, the position he held until his retirement.

**Carl M. Nye,** assistant chief engineer of the Great Northern, with headquarters at St. Paul, Minn., has been promoted to chief engineer succeeding **John R. W. Davis,** who retired on January 1. **Oscar S. Bowen,** assistant to chief engineer, retired also on January 1. **H. S. Loeffler,** bridge engineer, has been promoted to assistant chief engineer, replacing Mr. Nye, and **George V. Guerin, Jr.,** assistant bridge engineer, has been promoted to bridge engineer, relieving Mr. Loeffler. **J. B. Mitchell** has been appointed valuation engineer.

Mr. Davis was born at Phoenixville, Pa., on October 26, 1868, and graduated from Lehigh University in 1891. He entered railway service in July of that year as a rodman on the New York, Lake Erie & Western (now a part of the Erie), and in April, 1892, was promoted to assistant supervisor. He was advanced to assistant engineer in December, 1892, and held that position until February, 1898, when he was promoted to division engineer on the Chicago & Erie (now part of the Erie). Mr. Davis was further advanced to engi-

John R. W. Davis

neer of maintenance of way of the Erie in April, 1900. In January, 1901, he was appointed engineer of maintenance of way of the Chicago & Alton (now the Alton), and in November, 1901, he returned to the Erie as engineer of maintenance of way. Mr. Davis was appointed engineer of maintenance of way of the Great Northern in September, 1903, and in May, 1925, he was advanced to chief engineer, with headquarters at St. Paul, the position he held until his retirement. Mr. Davis is a charter member of the American Railway Engineering Association.

**Evariste M. Lewis,** engineering auditor of the Chicago Great Western, has been promoted to valuation-engineer, with headquarters as before at Chicago, succeeding **W. C. Harvey,** who retired on December 1.

Mr. Lewis was born at Southington, Conn., on May 6, 1882, and attended the University of Wisconsin for four years. He entered railway service in July, 1906, as a masonry inspector on the Great Western at Chicago and in August, 1912, he was appointed engineer in charge of the construction of the Mississippi River bridge at St. Paul, Minn. On September 1, 1913, he left the Great Western to go with George B. Swift & Company, general contractors, but returned to the Great Western a year later and was assigned to special engineering work in the office of the chief engineer at Chicago. From May, 1917, to January, 1918, he was placed in charge of the construction of grain storage tanks for the Independent Elevator (a subsidiary of the C. G. W.), and on February 1, 1918, he was promoted to division engineer, with headquarters at Des Moines, Iowa. Mr. Lewis was appointed engineering auditor in the office of the chief engineer at Chicago on January 1, 1925.

Mr. Harvey was born at Waverly, Ill., on November 14, 1870, and graduated from the University of Illinois in 1892. After teaching and working on a number of engineering projects, Mr. Harvey entered railway service in 1895, as a draftsman on the Illinois Central, later being promoted to instrumentman. A short time later he went with the Chicago Terminal Transfer (now the Baltimore & Ohio Chicago Terminal), as a bridge draftsman and assistant engineer and in 1901, he became chief draftsman on the Denver & Rio Grande Western at Salt Lake City, Utah. In 1902, he went with the Chicago & North Western as a draftsman and in 1905, he went with the Chicago Great Western as principal assistant engineer at St. Paul, Minn. Mr. Harvey was promoted to division engineer at Red Wing, Minn., in 1908, and in 1909, he returned to the general office as assistant engineer, to handle the large improvement program due to the reorganization of the property. In 1916, he was appointed valuation engineer, the position he held until his retirement.

**Noel W. Smith,** assistant chief engineer of the Pennsylvania, with headquarters at Philadelphia, Pa., retired on December 30 after more than 49 years' service with this company. Mr. Smith was born on December 25, 1869, at Williamsport, Pa., and first entered railway service in 1887 as a clerk on the Pennsylvania at that point. Two years later he entered Lehigh University and during summer vacations he worked on the Pennsylvania as a clerk, telegraph operator and rodman and on the Phila-

Noel W. Smith

delphia & Reading (now the Reading) as a transitman. Following his graduation in 1893 with the degree of civil engineer, Mr. Smith returned to the Pennsylvania as a rodman and later served successively as assistant track supervisor, track supervisor and assistant engineer. In 1909, he was ad-

vanced to division engineer of the Middle division and in the following year he became superintendent at Media, Pa., later serving in the same capacity at Altoona. In 1920, Mr. Smith was promoted to assistant general manager of the Central region at Pittsburgh, Pa., and in the following year he was transferred to the Eastern region at Philadelphia. In 1924, at the request of the United States government, he was granted a leave of absence to permit him to study and report on the condition and operations of the Alaska Railroad. Following submission of his report he was appointed general manager of this road, holding this position from December 19, 1924, to August 1, 1928. He then returned to the Pennsylvania as assistant general manager of the Eastern region, being appointed general superintendent of motor service on April 15, 1929. On December 1 of the same year he was appointed assistant chief engineer of the system, holding this position until his retirement.

**E. R. Lewis,** office engineer of the Michigan Central, with headquarters at Detroit, Mich., and formerly principal assistant engineer of the Michigan Central, retired on December 1. Mr. Lewis was born at Raritan, N. J., on November 20, 1869, and graduated from the University of Iowa in 1890. He entered railway service in 1895 as an axeman and rodman on construction on the Missouri Pacific, subsequently serving as a levelman and clerk in the timber department. He was promoted to division engineer in 1891 and left railroad service the following year to become a reclamation engineer in Wyoming. He was appointed division engineer on improvement work on the U. S. government levees along the Mississippi river in 1896, and in 1897 was locating engineer for the Cape Government railways in the Cape Colony, South Africa. He returned to the United States in 1901 and was consecutively engineer in charge of construction of the White River railroad (now part of the Missouri Pacific), at Batesville, Ark., and engineer in charge of location and construc-

E. R. Lewis

tion of the Fort Smith & Western until 1903, when he returned to the Cape Government railways, where he was consecutively employed as location engineer and district engineer in charge of maintenance until 1905, when he again returned to the United States. He was appointed assistant engineer of the Keweenaw Central (now a part of the Copper Range), with headquarters at Hancock, Mich., in 1905, and in August, 1906, he was appointed division engineer on the Michigan Central, with headquarters at Bay City, Mich. In June, 1912, he was appointed assistant to the general manager of the Duluth, South Shore & Atlantic, and in July, 1918, was promoted to chief engineer. He became managing editor of the Maintenance of Way Cyclopedia in March, 1919, and upon the completion of this work was appointed office engineer of the Michigan Central in March, 1921. Mr. Lewis was promoted to principal assistant engineer, with headquarters at Detroit on January 1, 1924, and in June, 1933, he was appointed office engineer, the position he held until his retirement.

**Felix S. Hales,** engineer of track of the New York, Chicago & St. Louis, has been promoted to bridge engineer, with headquarters as before at Cleveland, Ohio, succeeding **George Henry Tinker,** who retired on December 1. The position of engineer of track has been abolished.

Mr. Hales was born at Wilson, N. C., on April 13, 1893, and graduated in engineering

Felix S. Hales

from North Carolina State College in 1913, and in civil engineering from Cornell University in 1916. He entered railway service in 1916 as a draftsman for the Nickel Plate on grade elimination work and served in that capacity until June 1918, when he joined the U. S. Army as a second lieutenant in the field artillery. He returned to his former position with the Nickel Plate in December, 1918, and in 1919 he was appointed assistant to the corporate chief engineer. In 1920, Mr. Holes was appointed assistant engineer in charge of bridge design and steel inspection and in April, 1924, he was transferred to the track department as assistant engineer. Four months later, he was promoted to engineer of track, with headquarters as before at Cleveland, and his jurisdiction was extended to include the Lake Erie and Western district in 1925 and the entire system in 1927. In 1928, Mr. Hales was appointed engineer of the Cleveland Terminal improvements, and in 1934 he returned to his former position as engineer of track, which he held until his recent promotion, which was effective on December 1.

Mr. Tinker was born at Lawrence, Mass., on January 18, 1868, and graduated from the University of Nebraska in 1890. He entered railway service between terms of school in July, 1887, as an axman on the construction of the Burlington & Missouri River (now part of the Chicago, Burlington & Quincy) in Nebraska. From June,

George Henry Tinker

1889, to January, 1890, he served as a rodman on the same road and in June, 1890, following graduation, he was appointed assistant on construction, later serving as assistant topographer and draftsman. From August, 1893, to April, 1899, he engaged in private practice as an engineer in San Diego County, Cal., but returned to the Burlington & Missouri River as a transitman on the later date. Mr. Tinker was promoted to division engineer on construction in January, 1900, and September, 1901, he went with the Fremont, Elkhorn & Missouri Valley (now part of the Chicago & North Western) as an assistant engineer. Several months later he became an assistant engineer on the Colorado & Wyoming and in February, 1903, he left railroad service to become assistant engineer of the Minnequa Water Company, Minnequa, Colo. In April, 1904, Mr. Tinker returned to railroad service as a bridge inspector on the Nickel Plate and in July, 1905, he was promoted to assistant engineer. He was advanced to bridge engineer in January, 1907.

## Track

**C. Donnelly,** a track foreman on the New York Central, has been promoted to assistant supervisor of track of Subdivision No. 4 of the Eastern division, with headquarters at Hudson, N.Y., to succeed **C. H. Duffy,** who has retired.

**William Bruce Ferguson,** section foreman on the Atchison, Topeka & Santa Fe at Arkansas City, Kan., has been promoted to roadmaster, with the same headquarters, succeeding **Andrew N. Ferguson,** who retired on December 1.

**H. C. Koch,** track supervisor for the Belt Railway Company of Chicago, has been promoted to roadmaster, with headquarters as before at Clearing Yard, Ill., succeeding **A. B. Hillman,** whose promotion to engineer of maintenance of way of the Chicago & Western Indiana and the Belt Railway, is announced elsewhere in these columns. **V. V. Holmberg,** levelman on the C. & W. I., has been promoted to track supervisor on the Belt Railway, replacing Mr. Koch.

**John Hubert Burns,** assistant roadmaster on the Chicago, Rock Island & Pacific in charge of one of the system rail-laying gangs, has been promoted to roadmaster, with headquarters at St. Joseph, Mo., succeeding **R. M. Bristow,** who has been appointed a track supervisor.

**S. M. Rogers,** assistant supervisor of track on the New York division of the Pennsylvania, with headquarters at New Brunswick, N.J., has been promoted to supervisor of track on the Wilkes-Barre division, with headquarters at Reading, Pa., to replace **E. P. Adams,** whose promotion to assistant trainmaster is announced elsewhere in these columns. **Howard W. Martens,** assistant on the engineering corps, has been promoted to assistant supervisor of track at New Brunswick to replace Mr. Rogers.

**Bascom A. Bates,** assistant engineer in the office of the chief engineer of the Central of Georgia at Savannah, Ga., has been appointed supervisor of track, with headquarters at Macon, Ga. He succeeds **C. P. LeSueur,** whose appointment as trainmaster is noted elsewhere in these columns.

Mr. Bates was born on March 28, 1901, in Montgomery County, Ala., and received his higher education at the Alabama Polytechnic Institute, graduating in 1924 with a bachelor of science degree in civil engineering. Mr. Bates first entered railway service on February 17, 1925, with the Central of Georgia, as a draftsman in the office of the chief engineer at Savannah. On September 16, 1925, he was appointed assistant engineer in the same office, which position he was holding at the time of his recent appointment.

**Hugh O. Whitten,** whose promotion to division roadmaster on the Northern Pacific, with headquarters at Glendive, Mont., was announced in the December issue, was born at Burlington, Vt., on April 25, 1901, and graduated in civil engineering from the University of Maine in 1924. He entered railway service in December, 1926, as a rodman in the engineering department of the Northern Pacific and in January, 1928, he was promoted to instrumentman on construction work. In May, 1930, he was appointed track apprentice at Duluth, Minn., and in February, 1934, he was advanced to assistant bridge and building supervisor at Minneapolis, Minn. Mr. Whitten was promoted to roadmaster, with headquarters at Fargo, N. D., in June, 1935, and was later transferred successively to Glendive and Billings, Mont., being located at the latter point at the time of his recent promotion.

**Royal A. Johnson,** whose promotion to roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Parker, Ariz., was announced in the November issue, was born at Laird, Colo., on January 5, 1907, and entered railway service on June 14, 1924, as a chainman in the engineering department of the Santa Fe, serving in this capacity and later as a rodman on the Arizona and Albuquerque divisions. On March 28, 1932, he was furloughed and re-entered the service two days later as a section laborer on the Arizona division. On September 10, 1932, he was promoted to section foreman and on July 1, 1933, he was transferred to the Albuquerque division. On February 21, 1937, Mr. Johnson was transferred to the Los Angeles division, where he served as a section forman and an extra gang foreman until September 11, 1939, when he was advanced to assistant roadmaster at Needles, Cal., the position he held until his recent promotion, which was effective October 1.

**Forrest A. Triplett,** supervisor of track on the Western Maryland, with headquarters at Cumberland, Md., whose retirement was reported in the December issue, was born on April 18, 1877, at Elkins, W. Va. Mr. Triplett first entered railway service on February 8, 1892, as a trackman on the West Virginia Central & Pittsburgh (now part of the W. M.), with headquarters at Kerens, W. Va., and on May 4, 1897, he was advanced to foreman with headquarters at Elkins. In May, 1902, Mr. Triplett entered the service of the Coal & Iron Railroad (now also part of the W. M.) as foreman of a track-laying gang, and in September, 1904, he was appointed a general foreman on the Western Maryland, this company having taken over both the W. V. C. & P. and the C. & I. In December, 1904, Mr. Triplett was appointed supervisor of track, holding this position until November, 1907, when he was appointed general roadmaster. In April, 1914, he returned to the position of supervisor of track, with headquarters at Cumberland, continuing in this capacity until his retirement, which was effective on October 30.

## Bridge and Building

**J. F. Montgomery,** roadmaster on the St. Louis Southwestern at Dallas, Tex., has been promoted to bridge and building supervisor, with headquarters at Tyler, Tex., succeeding **J. L. Enright,** whose death on October 31, was announced in the December issue.

**Lewis F. Cooper,** whose promotion to master carpenter on the Chicago, Rock Island & Pacific, with headquarters at El Reno, Okla., was announced in the November issue, was born at Rosebud, Ark., on November 25, 1898, and entered railway service on May 18, 1919, as a bridge and building helper on the Indian Territory division, after several years' work for various lumber mills in Arkansas and Oklahoma. On June 15, 1919, he was promoted to carpenter and in 1922, he was advanced to relief bridge and building foreman and relief pile driver engineer. Mr. Cooper was promoted to bridge and building foreman on April 25, 1929, and in 1938 he was appointed steel bridge inspector. At the time of his recent promotion, he was a bridge foreman on the Oklahoma division.

## Obituary

**W. L. Campbell,** roadmaster on the Chicago & North Western at Chicago, died at his home in that city on January 2, at the age of 69 years.

**Arthur Munroe Kinsman,** former chief engineer and engineer of construction of the Baltimore & Ohio at Baltimore, Md., died on November 28 after a long illness. He was 83 years old.

**R. E. Gaut,** who resigned in the summer of 1910 as engineer of bridges of the Illinois Central, with headquarters at Chicago, to accept a position with the Leonard Construction Company, Chicago, later entering business in the East, died at his home in Yonkers, N. Y., on December 4.

**Forrest C. Brackett,** supervisor of bridges and buildings of the Terminal division of the Boston & Maine, with headquarters at Boston, Mass., died on December 1, following an operation. Mr. Brackett was born on November 16, 1888, at Wells, Me., and entered railway service with the Maine Central in 1907. Subsequently, after serving in various capacities, he became general foreman. In August, 1929, Mr. Brackett entered the service of the Boston & Maine as assistant bridge supervisor at Dover, N. H. In February, 1930, he was promoted to supervisor of bridges and buildings of the Terminal division.

**Philip George Lang, Jr.,** engineer of bridges of the Baltimore & Ohio, with headquarters at Baltimore, Md., died in that city on December 9, after an illness of several weeks. Mr. Lang was born at Philadelphia, Pa., on September 24, 1883, and graduated

**Philip George Lang, Jr.**

from the University of Pennsylvania in 1905. Following his graduation, he was employed at the Pencoyd plant of the American Bridge Company until March, 1906, when he went with the South & Western (later the Carolina, Clinchfield & Ohio and now part of the Clinchfield) at Johnson City, Tenn. On December 4, 1907, he went with the Baltimore & Ohio as an assistant engineer in the bridge department at Baltimore. On May 1, 1917, he was advanced to chief bridge draftsman and on August 1, 1918, he was promoted to assistant engineer of bridges. Mr. Lang was further advanced to engineer of bridges on May 1, 1921, the position he held at the time of his death. Mr. Lang has long been active in the American Railway Engineering Association and various other engineering societies. He was president of the American Welding Society in 1938 and served as editor of the Bridge Section of the 1926, 1929 and 1939 editions of the Railway Engineering and Maintenance Cyclopedia, the latter edition of which has just come from the press.

**Joseph Lawrence Enright,** supervisor of bridges and buildings, with headquarters at Tyler, Tex., whose death on October 31, was announced in the December issue, was

*This* **Rail Anchor**
Retains Its
INITIAL HOLDING POWER
after
*Countless Reapplications*

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*Ease of Installation—*
*Maximum Holding Power—*

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are in Successful Service.

## Woodings Forge & Tool Co.

**Verona, Pa.** **Chicago, Ill.**

born at Watertown, Wis., on May 10, 1879, and attended Sacred Heart College at Watertown for three years. He entered railway service on October 5, 1898, with the St. Louis-Southwestern Railway Company of Texas and later served as foreman of the bridge and building yard at Pine Bluff, Ark., and general building foreman, with headquarters at St. Louis, Mo. On October 1, 1916, he was appointed tie and timber agent, with headquarters at Texarkana, Ark., and on April 1, 1917, he returned to his former position as general building foreman at St. Louis. On May 1, 1919, he was appointed general supervisor of bridges and buildings of the Cotton Belt and the Louisiana & Arkansas, with headquarters at St. Louis. On March 1, 1920, Mr. Enright was appointed bridge and building supervisor on the Cotton Belt, with headquarters at Tyler, the position he held at the time of his death.

**William F. Miller,** assistant to the chief engineer, maintenance of way, of the Eastern region of the Pennsylvania, died on December 18 at his home in Ardmore, Pa., after a lingering illness of over a year's

**William F. Miller**

duration. Mr. Miller was born in Philadelphia on June 21, 1880, and received his technical engineering education under the private tutorship of Edwin S. Gault, and later Professor Conway, both of the University of Pennsylvania. His entire railroad service was with the Pennsylvania railroad, starting as a messenger in the West Philadelphia train dispatcher's office on July 25, 1892. He was transferred to the engineering department in which he served as a rodman, transitman and on January 16, 1907, was appointed assistant track supervisor at Altoona. Subsequently, Mr. Miller was advanced to supervisor, then assistant trainmaster, and on August 1, 1914, was appointed pilot and cost engineer in the valuation department. Mr. Miller was promoted to division engineer on the Williamsport division on March 1, 1920, and later transferred to a similar position on the Maryland division at Wilmington, Del. He was appointed engineer, maintenance of way, of the Eastern Pennsylvania general division at Harrisburg, Pa., on April 1, 1926. Mr. Miller had been granted a leave of absence on account of illness from February, 1938, to February 1, 1939, when he was assigned to the position he held at the time of his death.

# Association News

## Bridge and Building Association

President A. E. Bechtelheimer has called a meeting of the Executive committee of the association at Chicago on Saturday, January 13, to complete the organization of committees and transact other business.

## Roadmasters Association

The Executive committee met in Chicago on December 9 with President G. L. Sitton, Vice-Presidents J. J. Clutz and A. B. Hillman, Secretary C. A. Lichty and Treasurer E. E. Crowley, Executive Committee Members E. J. Brown, H. E. Kirby and J. M. Miller, and Past-President Elmer T. Howson in attendance. E. C. Argust (Morden Frog and Crossing Works), vice-president of the Track Supply Association, also attended a portion of this session as a representative of this association. In addition to completing the personnel of committees and transacting other routine business of the association, the committee voted to hold the next annual convention at the Stevens hotel, Chicago, on September 10-12, 1940.

It was also decided to create a junior membership classification and the Amendments committee was instructed to draft an amendment for presentation at the next annual convention, which would offer membership of this classification to track apprentices, assistants on engineering corps and other young men entering or interested in track work.

## American Railway Engineering Association

As the result of action of the Nominating committee of the association, the following names will appear on the ballot for officers to be mailed shortly to members: President, Geo. S. Fanning, chief engineer, Erie, Cleveland, Ohio; second vice-president, H. R. Clarke, engineer maintenance of way, Chicago, Burlington & Quincy, Chicago.

Directors (three to be elected), A. A. Miller, chief engineer maintenance of way, Missouri Pacific, St. Louis, Mo.; F. R. Judd, engineer of buildings, Illinois Central System, Chicago; G. P. Palmer, engineer maintenance and construction, Baltimore & Ohio Chicago Terminal, Chicago; R. A. Van Ness, bridge engineer, system, Atchison, Topeka & Santa Fe, Chicago; H. F. Brown, assistant electrical engineer, New York, New Haven & Hartford, New Haven, Conn.; W. M. Wilson, research professor of structural engineering, University of Illinois, Urbana, Ill.; C. P. Richardson, engineer capital expenditures, Chicago, Rock Island & Pacific, Chicago; B. R. Kulp, engineer maintenance of way, Chicago & North Western, Chicago; and Armstrong Chinn, chief engineer, Alton, Chicago.

In addition to the above names to be balloted upon, F. L. C. Bond, vice-president and general manager, Central region, Canadian National Railways, Toronto, Ont., will be advanced automatically to senior vice-president.

Bulletin No. 414 was mailed to members late in December, containing the reports of the committees on Buildings; Water Service, Fire Protection and Sanitation; Yards and Terminals; Maintenance of Way Work Equipment; Rules and Organization; Economics of Railway Labor; Highways; and Clearances. Bulletin No. 415 will be mailed to members during January and will include the reports of the committees on Records and Accounts; Wood Bridges and Trestles; Masonry; Iron and Steel Structures; Impact; and Waterproofing of Railway Structures.

With the work of the committees so nearly completed, only three committees held meetings during December, and only one has scheduled a meeting during January. The meetings held in December were those of the Committee on Rail, which met at New York on December 7, the Committee on Waterproofing of Railway Structures, which met at Chicago on December 8 and 9, and the Committee on Impact, which met at Chicago on December 13. The one meeting scheduled for January is that of the Committee on Yards and Terminals, which will meet at Cleveland, Ohio, on January 15.

## Maintenance of Way Club of Chicago

Rail Damage by Locomotives was the subject considered at the December 18 meeting of the club, when, following dinner at 6:30 p. m., J. M. Farrin, assistant engineer, Illinois Central System, discussed the results of rail stress measurements made on the Illinois Central under a variety of locomotives operated at high speeds. Eighty-six members and guests were in attendance.

The program of the next meeting, to be held on Monday, January 28, will include a symposium on Joint and Rail End Maintenance. In this, C. W. Baldridge, assistant engineer, Atchison, Topeka & Santa Fe, Chicago, will discuss the essential elements of rail joint design; J. B. Martin, general inspector of track, New York Central, Cleveland, Ohio, will discuss the trackman's responsibility for the maintenance of rail joints and the protection of rail ends; and A. B. Chaney, district engineer, Missouri Pacific, Little Rock, Ark., will discuss means of rebuilding rail joints and rail ends by welding, heat treating and grinding, and the use of joint shims and oversize and reformed bars.

## Wood-Preservers' Association

The American Wood-Preservers' Association will hold its thirty-sixth annual convention at the Coronado hotel, St. Louis, Mo., on January 23-25. The sessions on the opening day will be given over largely to the reports of the various preservative committees and the reports of the committees on Tie Service Records and on Bridge and Structural Timber. A special feature of the program for this convention is the Users Day Session, at which G. R. Smiley, chief engineer, Louisville & Nashville Railroad, will present a paper on The Stacking, Seasoning and Treatment of Gum Timber for Railroads; G. W. Harris, chief engineer, Atchison, Topeka & Santa Fe System, will speak on What We Can Expect from Treated Ties; G. H. Trout, bridge engineer, Union Pacific System, will present a paper

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on The Pre-Framing of Timber for Use in Bridges; and Elmer T. Howson, editor, *Railway Engineering and Maintenance*, will speak on Diversified Uses of Creosoted Wood by the Railroads.

During the convention opportunity will be afforded those attending to visit treating plants in the vicinity of St. Louis.

### National Railway Appliance Association

At a meeting of the Board of Directors of the National Railway Appliances Association on December 15, the association accepted applications for space at the twenty-ninth annual exhibit to be held at the International Amphitheatre, Chicago, on March 11-14, coincident with the convention of the American Railway Engineering Association, from 67 manufacturers of materials and equipment used in the construction and maintenance of railway tracks, bridges, buildings, water stations and allied railway facilities.

The amount of space requested and assigned represents approximately 75 per cent of the total space available for exhibits. This is considerably in excess of the amount of space assigned for the last exhibit at the corresponding meeting of the Board of Directors on January 27, 1939.

The action taken on the part of so many companies at this early date in making definite arrangements to be represented at the exhibit, and the further inquiries that are being made of C. H. White, secretary, (Industrial Brownhoist Corporation), 208 So. LaSalle St., Chicago, indicate the optimism among railway supply companies over larger programs of maintenance and improvement work on the railways in 1940, and forecast a larger and more comprehensive exhibit than has been held in recent years.

A list of the companies which have arranged to present exhibits to date follows:

Adams & Westlake Company, Chicago
Air Reduction Sales Company, New York
American Car & Foundry Co., New York
American Fork & Hoe Co., Cleveland, Ohio
American Hoist & Derrick Co., St. Paul, Minn.
Armco Railroad Sales Company, Middletown, Ohio
Barco Manufacturing Company, Chicago
Buda Company, Harvey, Ill.
Chipman Chemical Company, Inc., Bound Brook, N. J.
Cleveland Frog & Crossing Co., Cleveland, Ohio
Crerar, Adams & Co., Chicago
Cullen-Friestedt Company, Chicago
Dearborn Chemical Company, Chicago
DeSanno & Son, Inc., A.P., Philadelphia, Pa.
Dickinson, Inc., Paul, Chicago
Duff-Norton Manufacturing Company, Pittsburgh, Pa.
Eagle Grinding Wheel Company, Chicago
Eaton Manufacturing Company (Reliance Spring Washer Division), Massillon, Ohio
Elastic Rail Spike Corp., New York
Electric Tamper & Equipment Co., Ludington, Mich.
Fairbanks, Morse & Co., Chicago
Fairmont Railway Motors, Inc., Fairmont, Minn.
Fulton Asphalt Company, Chicago
Gary Screw & Bolt Co., Pittsburgh, Pa.
General Electric Co., Schenectady, N. Y.
Homelite Corporation, Port Chester, N. Y.
Hubbard & Company, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Ingersoll-Rand Company, New York
International Harvester Co., Chicago
Johns-Manville, New York
Jordan Company, O. F., East Chicago, Ind.
Kalamazoo Railway Supply Co., Kalamazoo, Mich.
Lehon Company, Chicago
Lewis Bolt & Nut Co., Minneapolis, Minn.
Lundie Engineering Corp., New York
Maintenance Equipment Co., Chicago
Mall Tool Company, Chicago
Master Builders Company, Cleveland, Ohio
Metal & Thermit Corp., New York
Morden Frog & Crossing Works, Chicago
National Aluminate Corp., Chicago
National Carbide Corp., New York
National Lead Co., New York
National Lock Washer Co., Newark, N. J.
Nordberg Manufacturing Co., Milwaukee, Wis.
Oxweld Railroad Service Co., Chicago
Pettibone Mulliken Corp., Chicago
Philadelphia Steel & Wire Corp., Philadelphia, Pa.
Pocket List of Railroad Officials, New York
Rail Joint Company, The, New York
Railroad Accessories Corp., New York
Rails Company, The, New Haven, Conn.
*Railway Engineering and Maintenance*, Chicago
Railway Purchases and Stores, Chicago
Railway Track-Work Co., Philadelphia, Pa.
Ramapo Ajax Division, American Brake Shoe & Foundry Co., New York
Republic Steel Corp., Cleveland, Ohio
Sperry Rail Service, Hoboken, N. J.
Syntron Company, Homer City, Pa.
Teleweld, Inc., Chicago
Templeton, Kenly & Co., Chicago
Timber Engineering Co., Washington, D. C.
United States Wind Engine & Pump Co., Batavia, Ill.
Western Railroad Supply Co., Chicago
Woodings-Verona Tool Works, Verona, Pa.
Woolery Machine Co., Minneapolis, Minn.

# Supply Trade News

## General

**Henry Billing** has been elected a vice-president of the **Collins Oil & Manufacturing Co., Inc.**, New York; his activities will be in both the railroad and industrial fields. The Collins Oil & Manufacturing Co., Inc., entered into a contract on September 1, with the Asphalt Process Corporation under which it will act as its sole sales representative for all of the products manufactured by the Asphalt Process Corporation.

## Personal

**Maynard D. Church** has been elected a vice-president of the **Worthington Pump & Machinery Corp.**, Harrison, N.J. Mr. Church is also president of the Moore Steam Turbine Corporation, Wellsville, N.Y., a Worthington subsidiary, and will continue in charge of the Moore operations. **R. W. Towne,** secretary and assistant treasurer since 1936 of the Moore organization, has been elected assistant secretary of the Worthington Pump & Machinery Corp.

**M. J. Rotroff,** sales engineer in charge of creosote oil sales to railroads for the Barrett Company, New York, has been appointed sales engineer in charge of railway sales for the **Buda Company,** in the Eastern territory, with headquarters at 253 West 64th street, New York. After leaving the engineering school of the University of Michigan, Mr. Rotroff spent two years with the Illinois Steel Company, following which he spent seven years in sales and service work with the railway division of the Ingersoll Rand Company. For the last four years, he has been associated with the Barrett Company.

**O. M. Bernuth,** president of the Bernuth-Lembcke Company, New York, has been elected also president of the **Chipman Chemical Company,** Bound Brook, N.J., effective January 1, the latter company having become a wholly-owned subsidiary of the Bernuth-Lembcke Company. Mr. Bernuth succeeds **R. N. Chipman,** who has resigned. **Charles Bernuth** has been appointed assistant to the president of the Chipman Chemical Company at Bound Brook, and **Warren H. Moyer,** secretary and treasurer of this concern, has become vice-president and treasurer, with headquarters as before at Bound Brook. **D. P. Webster** continues as vice-president and **W. R. Evans** as assistant treasurer of the Chipman Chemical Company.

**Walter F. Kasper,** vice-president and vice-chairman of the board of **Fairmont Railway Motors, Inc.,** Fairmont, Minn., has been elected president and chairman of the board, to succeed **Howard M. Starrett,** whose death on November 23, was announced in the December issue. **Robert H. McCune** has been elected vice-president.

Mr. Kasper entered the employ of Fairmont in 1913, after graduating from the mechanical engineering department of the University of Minnesota, and has been with that company continuously since that time, as head of the engineering department. In 1919, he was also placed in charge of the sales department as chief engineer and sales manager, which position he held until 1929, when he was elected vice-president in charge of engineering and sales. In June, 1939, he was also made vice-chairman of the board. In addition to his new duties he will as heretofore continue actively in charge of engineering and sales.

Mr. McCune has been engaged in the practice of law in Fairmont since 1917, except for a year and a half which he spent in military service during the World War. He has been actively interested in the management of Fairmont Railway Motors, having served as general counsel for many years and as a director since 1926. He plans to retire from the general practice of law and devote his entire time to affairs of Fairmont Railway Motors.

## Trade Publications

**Longlife Roof Coating**—The Flexrock Company, Philadelphia, Pa., has published a four-page illustrated folder which is devoted to a discussion of the uses and advantages of this company's Longlife roof coating.

**Compressors and Vacuum Pumps**—The Ingersoll-Rand Company, New York, has issued a 34-page illustrated catalog featuring its line of Type 30 compressors and vacuum pumps. The first part of this catalog deals with the various features and advantages that are common to the complete line of Type 30 compressors, after which it takes up individually and describes in detail the various units making up this line. Other products covered in the catalog include vacuum pumps, portable paint spray units and accessory equipment for compressors.

**Continuous Welded Rail**—This is the title of a six-page folder issued by the Air Reduction Sales Company, New York, which comprises a discussion of the continuous butt-welding of rails as a means of reducing track maintenance costs at mines. The folder discusses three methods that may be used for the butt-welding of such rail, namely, bronze welding by the oxy-acetylene process, steel welding by the same process, and steel welding by the metallic arc process. It also contains a summary of a recent series of tests of butt-welded joints and a brief description of equipment used in making butt welds.

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I-R Tie Tampers, Air Compressors and Spot Tampers are the ideal tools for track maintenance. I-R Tie Tampers compact ballast under ties with uniform solidity, eliminate water pockets and consequent sagging of track. I-R Air Compressors deliver 23% more air and save as high as 65% fuel costs per cubic foot of air. The I-R Spot Tamper is the handy mobile compressor for the odd jobs along the line. It is provided with either end rollers, pneumatic or plain steel wheels to suit individual requirements.

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"All right, how?"

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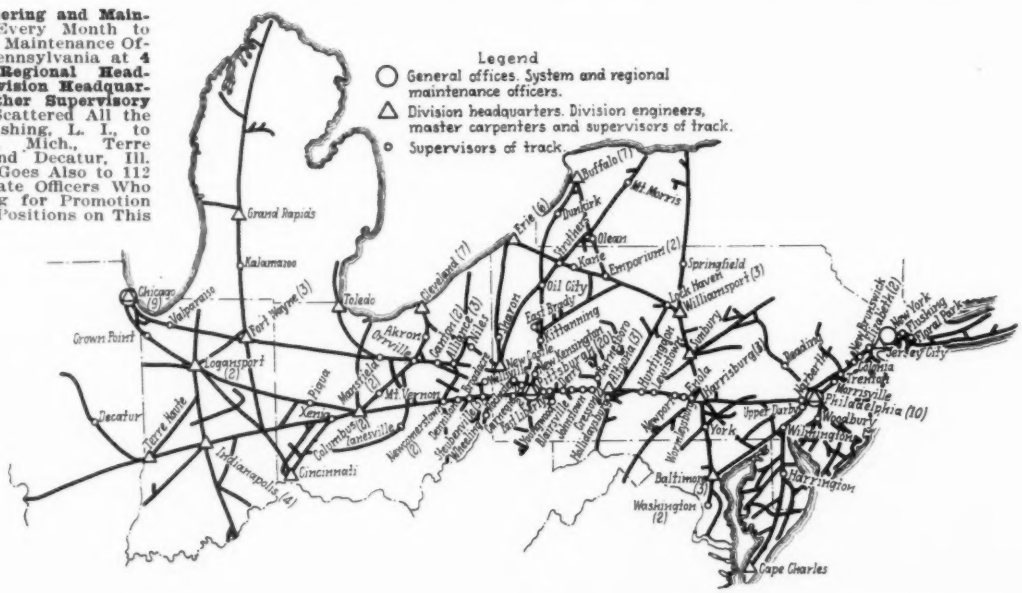
"That's simple as A, B, C, Boss. I'm spending too much time telling the men whom I call on about our company and what we make. Why, the last two issues of this magazine alone reported 130 new men in supervisory maintenance jobs—800 men to acquaint with our products every year. If these men knew all about us, I could get down to brass tacks in a hurry and get the additional business you want. Don't you realize how advertising helps to introduce a salesman to the new men in the field? And it keeps our products before the old-timers, too, between calls."

"You win. I see your point. We'll start at once."

*Among publishers a renewal of 60 per cent is considered good.

**Railway Engineering and Maintenance** Goes Every Month to 168 Supervisory Maintenance Officers of the Pennsylvania at **4 General and Regional Headquarters, 22 Division Headquarters and 66 Other Supervisory Headquarters,** Scattered All the Way from Flushing, L. I., to Grand Rapids, Mich., Terre Haute, Ind., and Decatur, Ill. This Magazine Goes Also to 112 Other Subordinate Officers Who Are in Training for Promotion to Supervisory Positions on This Railway.

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**Clamshell Bucket . . . . Magnet**
**Pile Driving Equipment . . . Hook**

**Model 15 Burro Crane re-laying rail on single track road. To clear for trains, the Crane can be set off the track by power in less than two minutes, or because of its high travel speed, 26 miles per hour, it can quickly be run to a nearby siding.**

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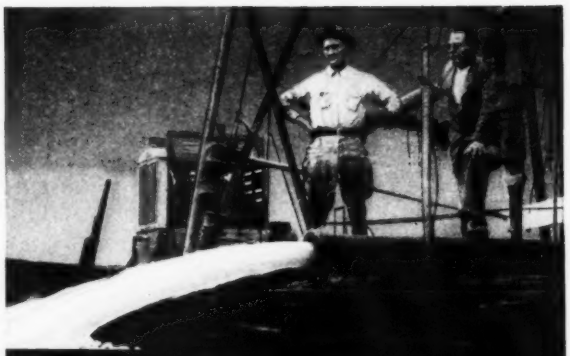
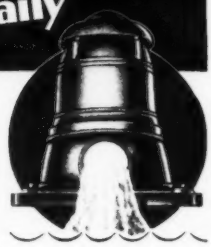


# A Few Gallons-or Many Millions Daily



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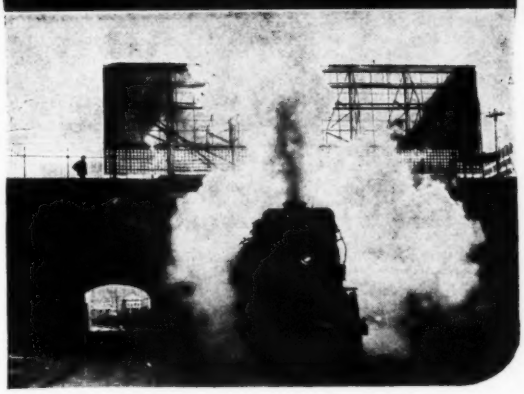

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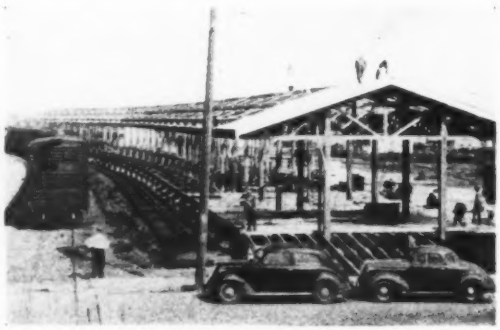

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TECO Split Rings produce stronger timber joints for all types of light and heavy frame railway structures.
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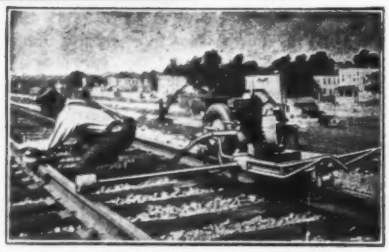

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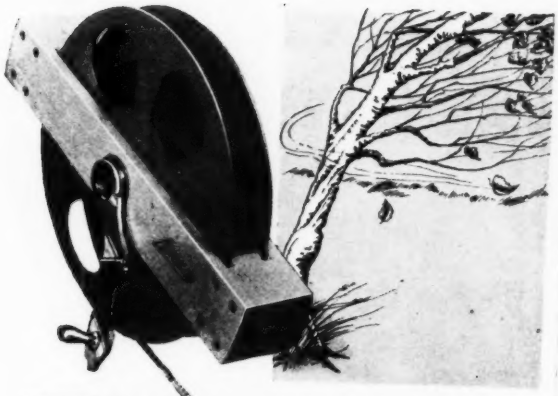

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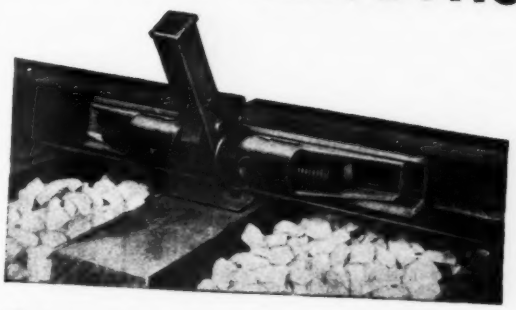

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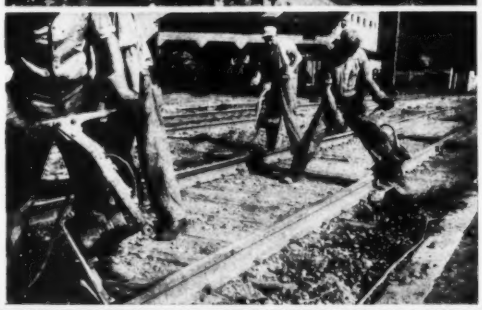

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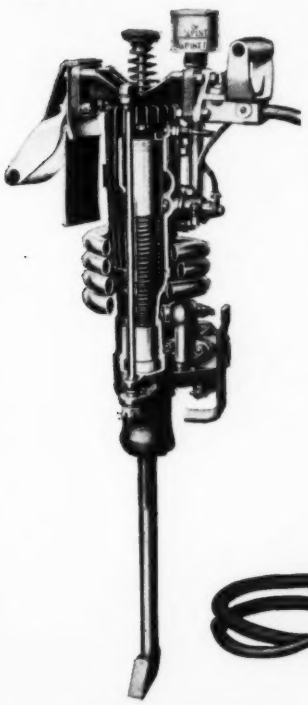

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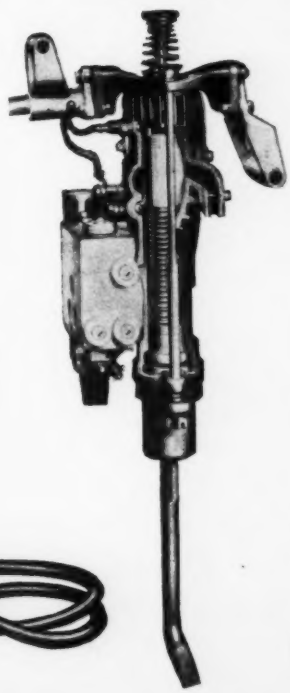

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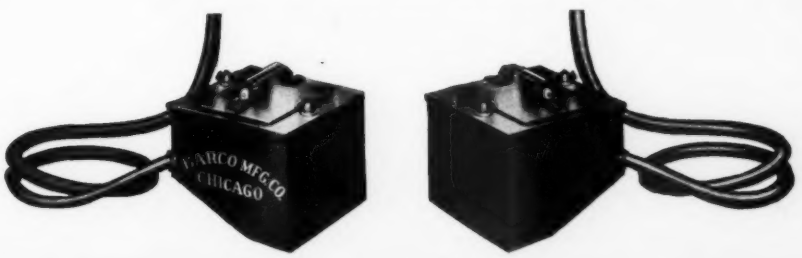


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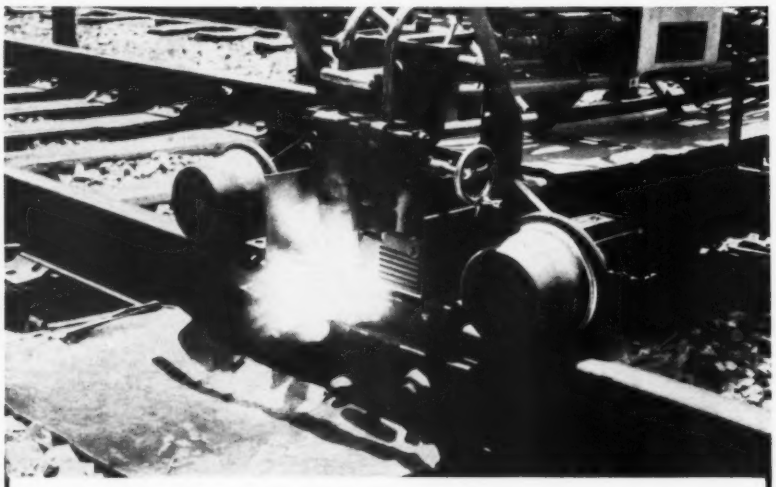
# *Oxweld Railroad Service* TOPICS

1912 — OVER A QUARTER CENTURY OF SERVICE TO AMERICAN RAILROADS — 1939



## OXWELD RAIL-END HARDENING

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End-hardening of all new rail to postpone batter is now standard practice on most railroads. The Oxweld method provides one of the most economical, efficient, and convenient means of rail-end hardening. The initial cost is low and the resulting savings in joint maintenance expense are substantial. This method permits the uniform production of adequate hardness for the rail service requirements. The work can be readily performed in track without interrupting traffic and without tying up railroad equipment.

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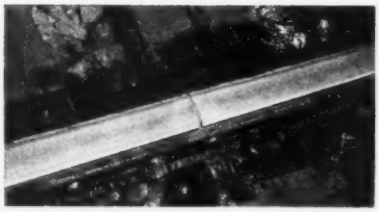

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***Butt-Welded Rail*** — Smooth-riding, clickless track and the elimination of signal bonds and joint maintenance are among the advantages of butt-welded rail which can be obtained with the Oxweld Automatic Pressure-Type Rail Welding Process.

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• • •

In addition to bringing to railroads the oxy-acetylene process applications described on this page, Oxweld Railroad Service provides for installing welded signal bonds, reclaiming worn joint bars, rebuilding frogs and switch points, and Unionmelt welding. For complete information on any of these operations, consult The Oxweld Railroad Service Company, Unit of Union Carbide and Carbon Corporation, Carbide and Carbon Building, Chicago and New York.

OXWELD RAILROAD SERVICE

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